FOUNDRY TRADE JOURNAL

EST. 1902

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FROM

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UP TO

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MOST MODERN FOUNDRIES

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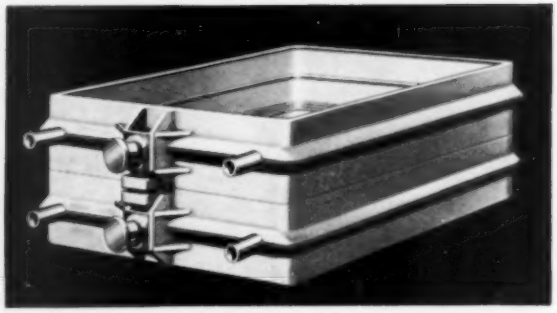

Sooner or later you will invest in Sterling moulding boxes because Sterling give you what you want. It is always possible to buy something a little cheaper but experience teaches that the best is the cheapest in the long run and there is no doubt that Sterling boxes are the best. Sterling were in the forefront fifty years ago. Fifty years of effort have maintained them there. Sterling keep ahead of the job, like only a leader can.

★ *Sterling have technical staff always available to discuss the best box for your particular needs, and this Sterling service is world-wide. Sterling representatives will be pleased to call at your request.*

Sterling Boxes are Light, Accurate, Durable, Strong and Interchangeable. They are made in a wide range of sizes from 9ins. square to anything up to around 14ft. in width to around 27ft. in length for special requirements.

Sterling boxes are made for bench moulding of the simplest kind to the most highly mechanised foundries using the latest automatic machines. They are made for lightly rammed boxes, to boxes used on the latest type of very high pressure moulding machines.

Illustration shows model style 'SLT'

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HIGH SPEED CYCLE

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TABLE HEIGHT RAPIDLY SET AND LOCKED HYDRAULICALLY

MACH. No.	APPROX. CAPY OF CORE	CLAMP CYL. DIA.
910	25 lbs.	10"
916	75 lbs.	16"
924	175 lbs.	24"

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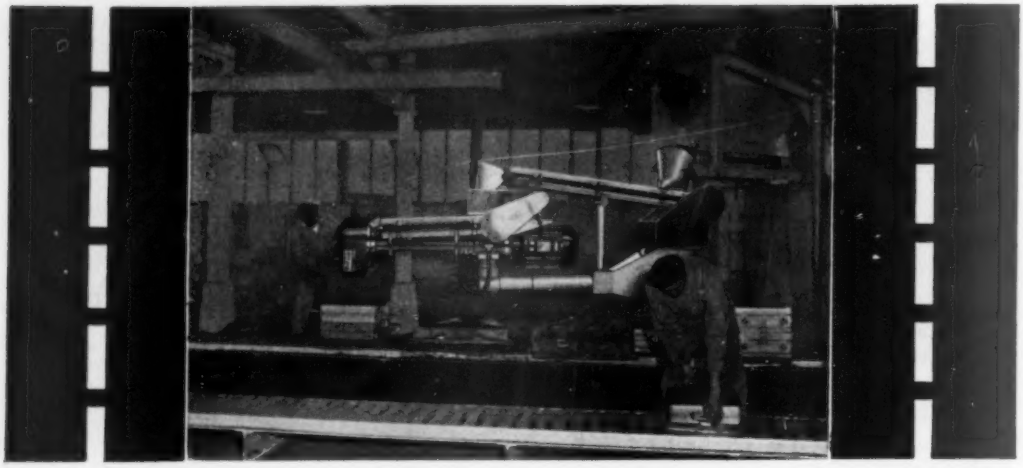
One of our S.P.M.'s in production

ON JOBBING WORK—BUT UNDER A CONTINUOUS PROCESS!



The above photograph, appearing by the kind permission of The Alliance Foundry Co. Ltd., of Luton, Beds., shows one of our Sand Projection Machines No. 6, which has been installed and is now operating in their Foundry.

It is indeed a recommendation for our machines that this particular Foundry, one of the most modern and progressive in Southern England, catering for medium sized grey iron castings, should have selected our S.P.M. Machine to replace their previous sand ramming unit.

Why not follow their lead!

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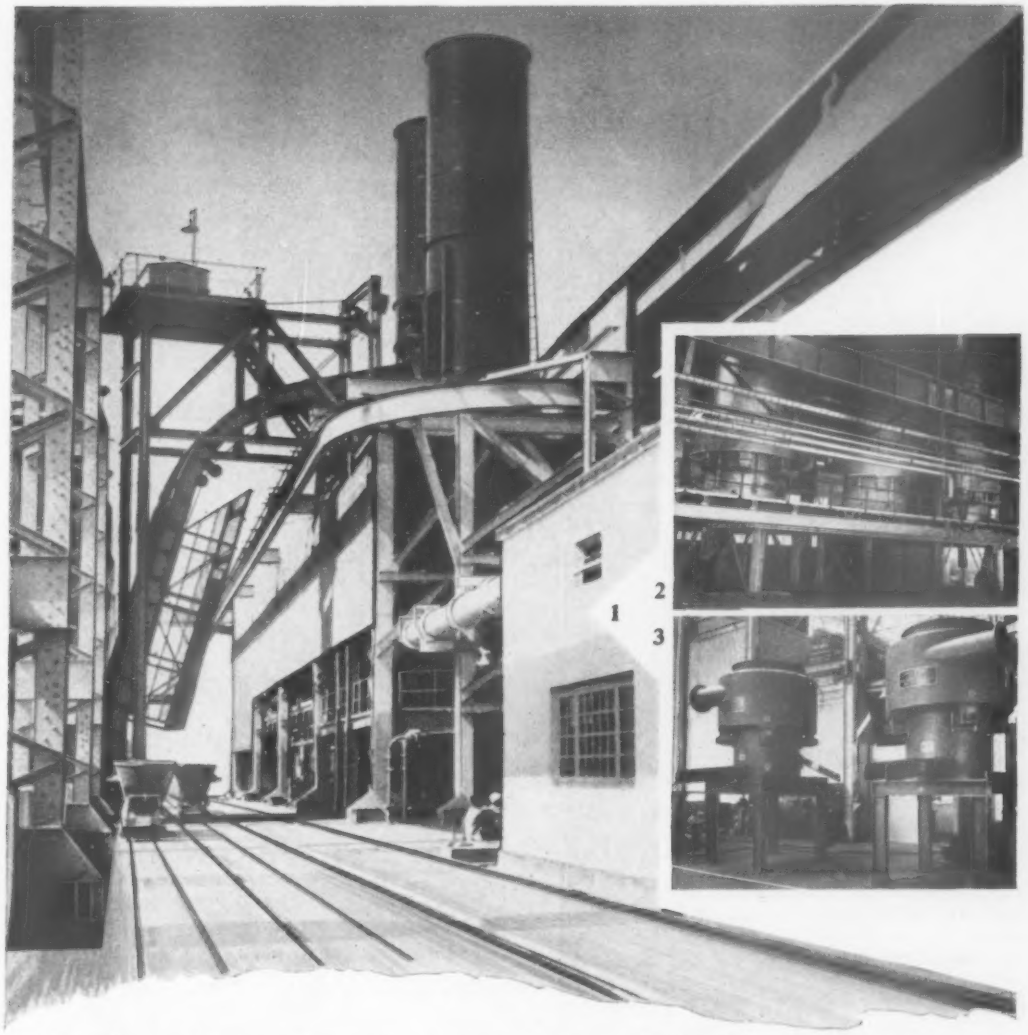

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Photographs:

(1) Two 20-ton-per-hour cupolas with swivel charger bridging a rail track. (Indian Iron & Steel Co. Ltd.)

(2) Three 35-ton-per-hour cupolas with automatic air weight control and wet dust arresters. (Guest Keen Iron & Steel Co. Ltd.)

(3) Bottom sections of two 4-ton-per-hour cupolas in the works.

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That's where experience scores! Use SINEX experience on your problem!

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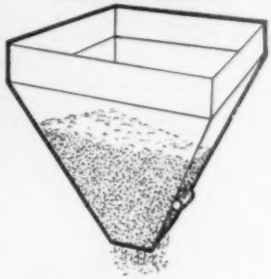
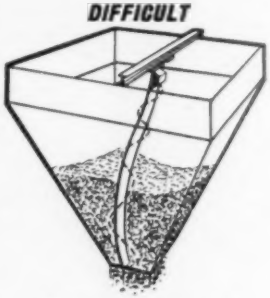


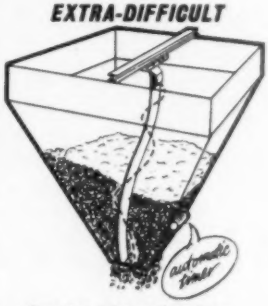
External vibrator on steel hopper.

DIFFICULT



Vibrating reed. Used where external vibration is impractical, i.e. concrete hoppers and difficult structures.

EXTRA-DIFFICULT



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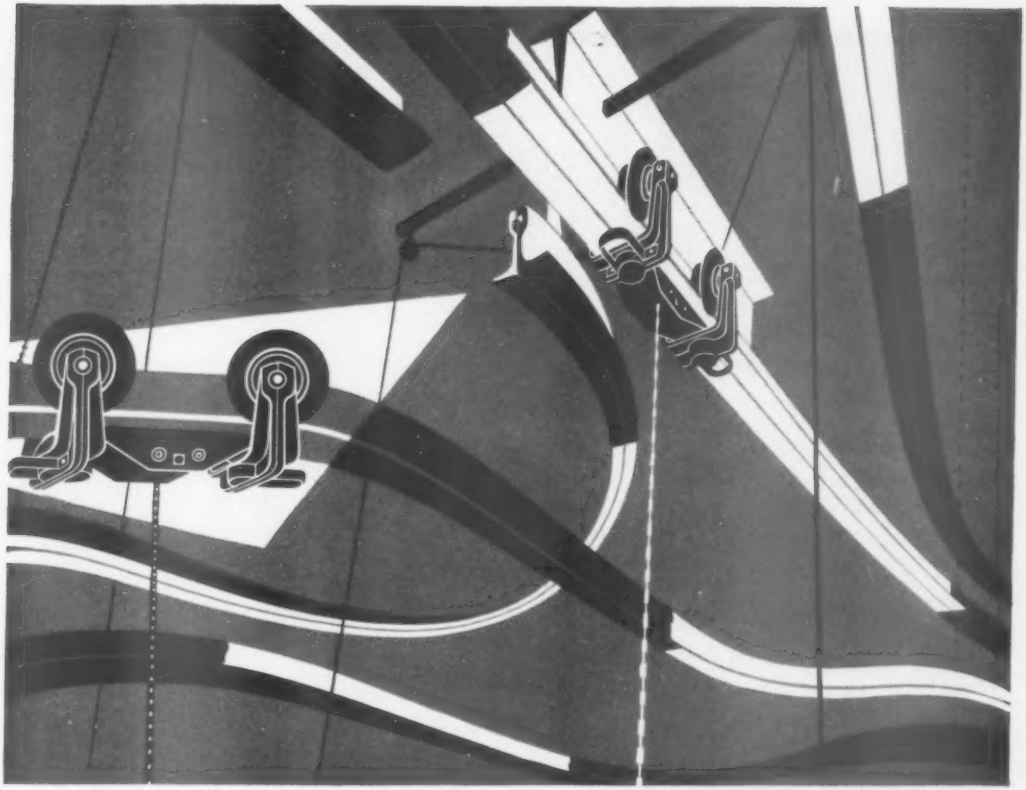
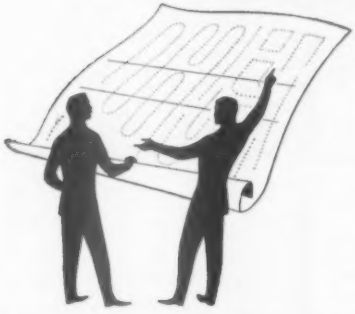


OVERHEAD is the open road



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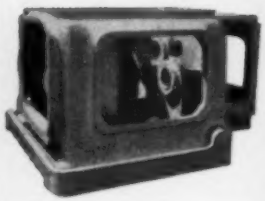
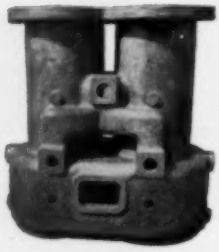
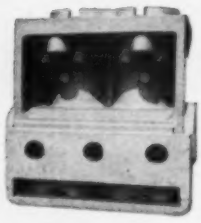
TG A. BM1

All these intricate iron castings were produced by Robert Cort & Son Ltd., Reading, using CO_2 for core and mould hardening and Isopropyl Alcohol as the base for the flash dressing. You can get this sort of result simply and consistently in your foundry too.







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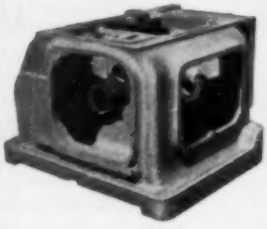

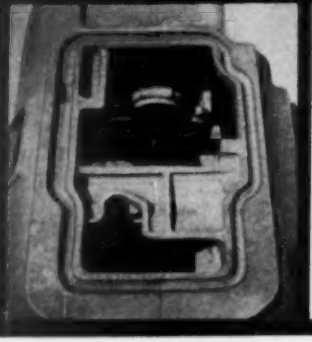

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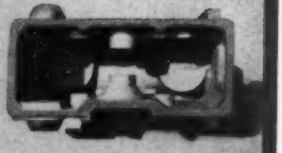
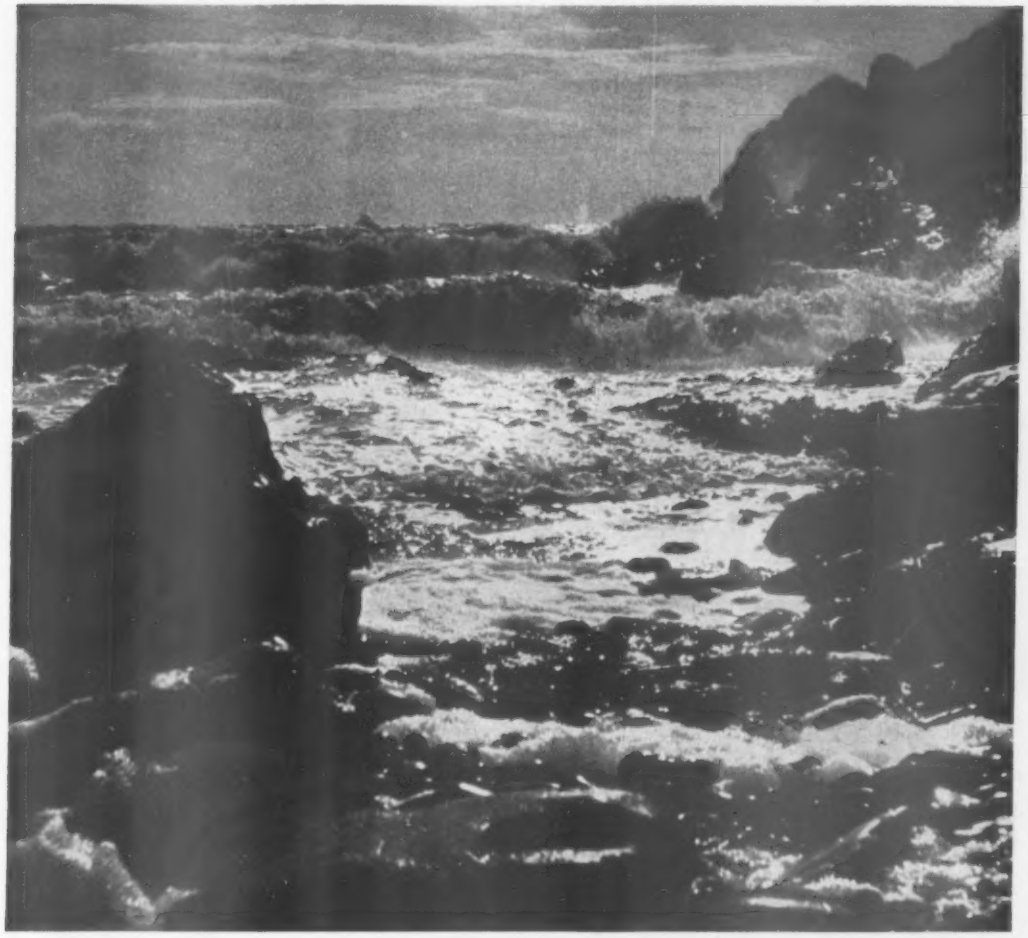


TA 2570



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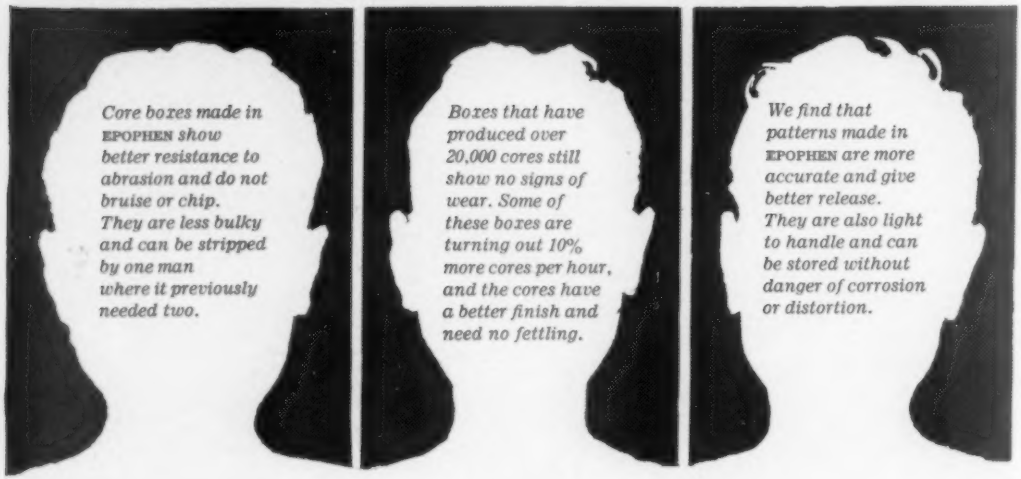
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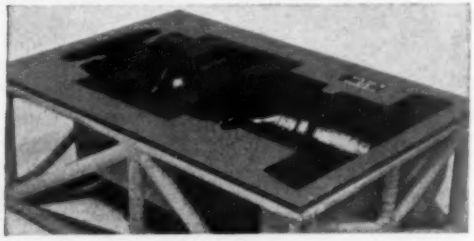

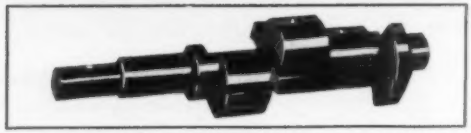

An EPOPHEN *pattern for half a crankshaft measuring 20" long.*

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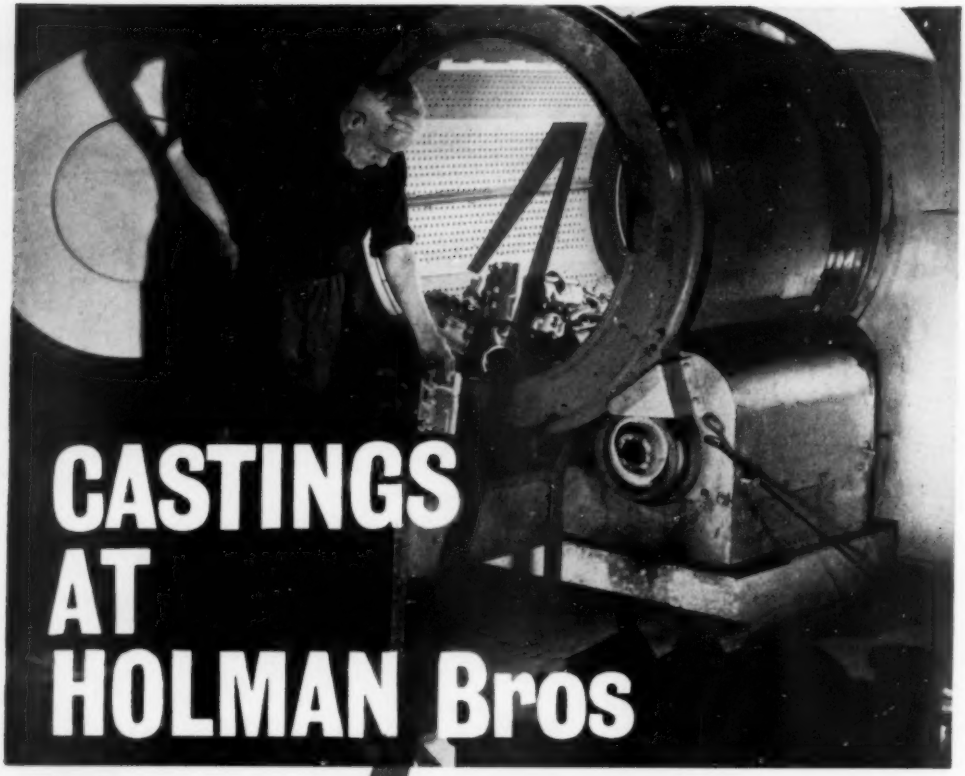

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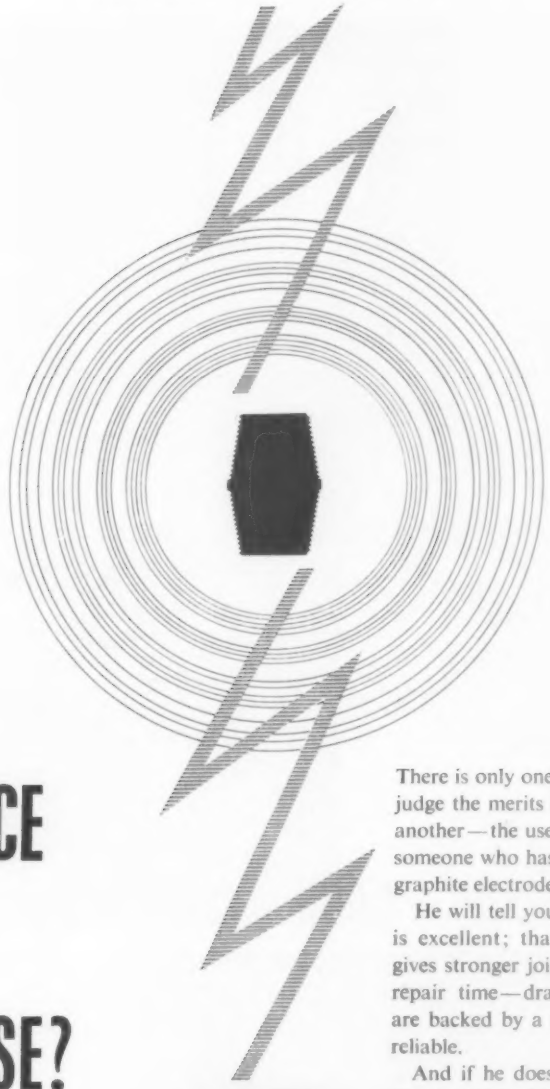

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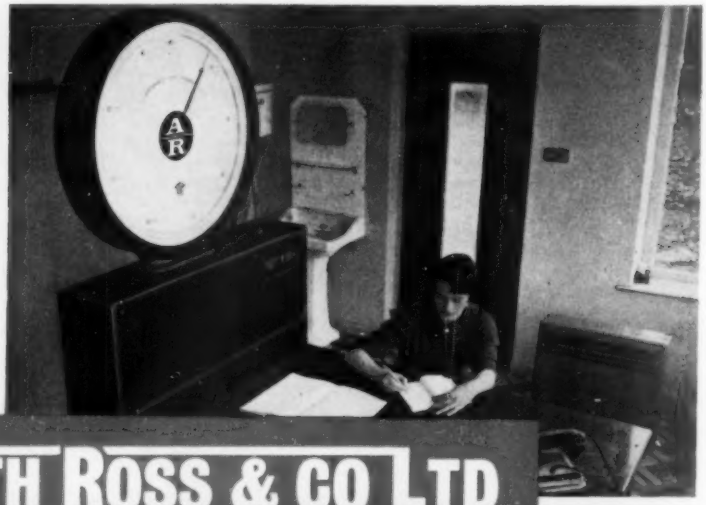

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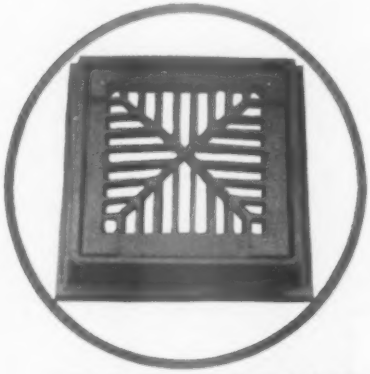

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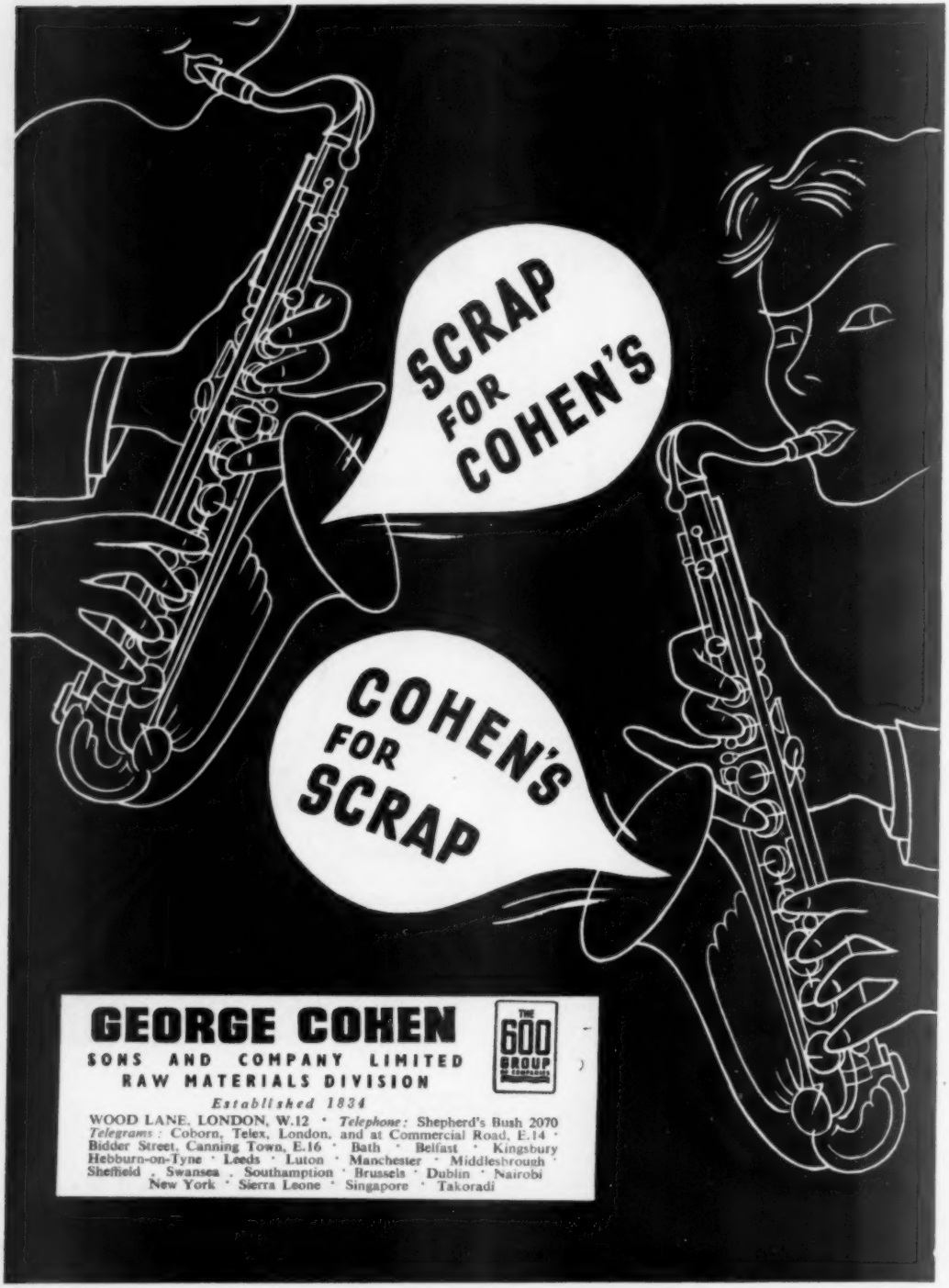
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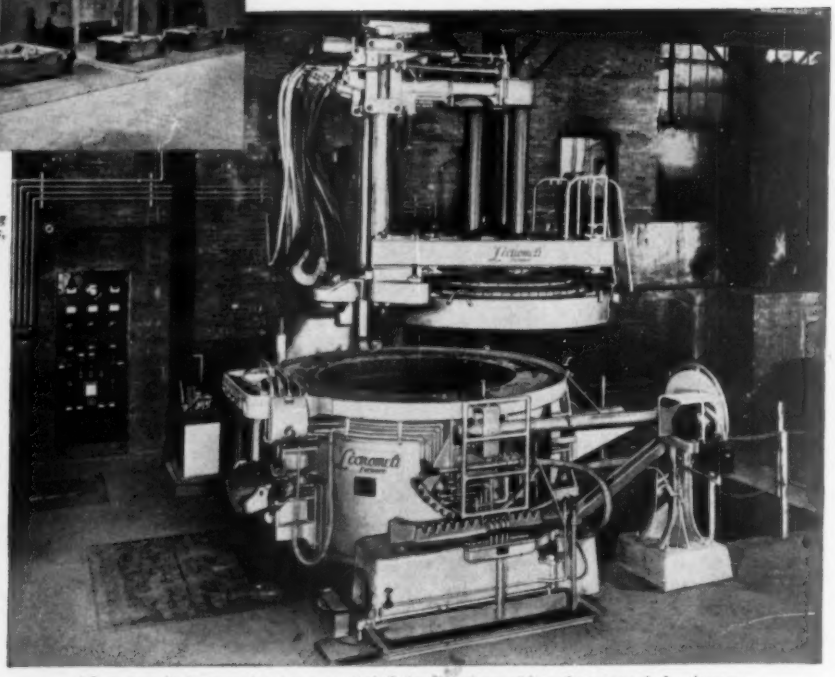
Demag high-frequency induction furnace installation at a steel making plant, incorporating two 1 ton capacity furnaces, two 660 lb. capacity furnaces, and one 110 lb. capacity furnace.



A 3 ton capacity Lectromelt arc furnace of 9' 0" diameter shown with roof swung ready for charging.

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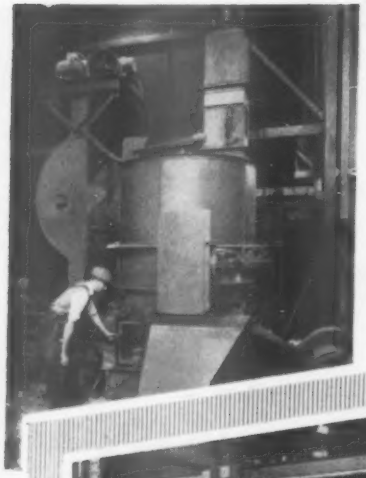

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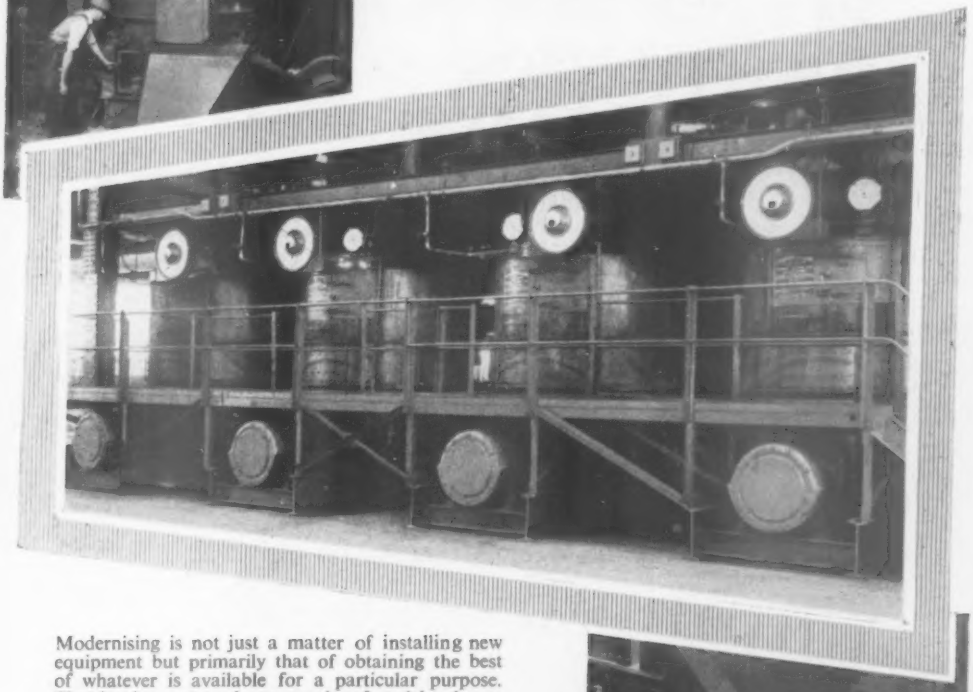

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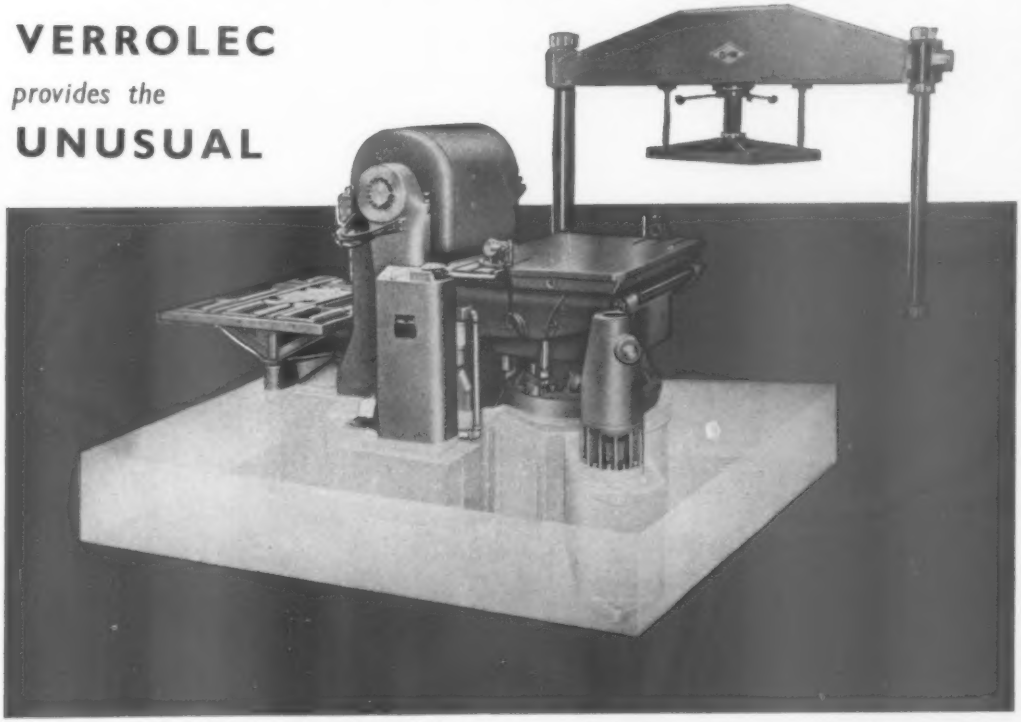

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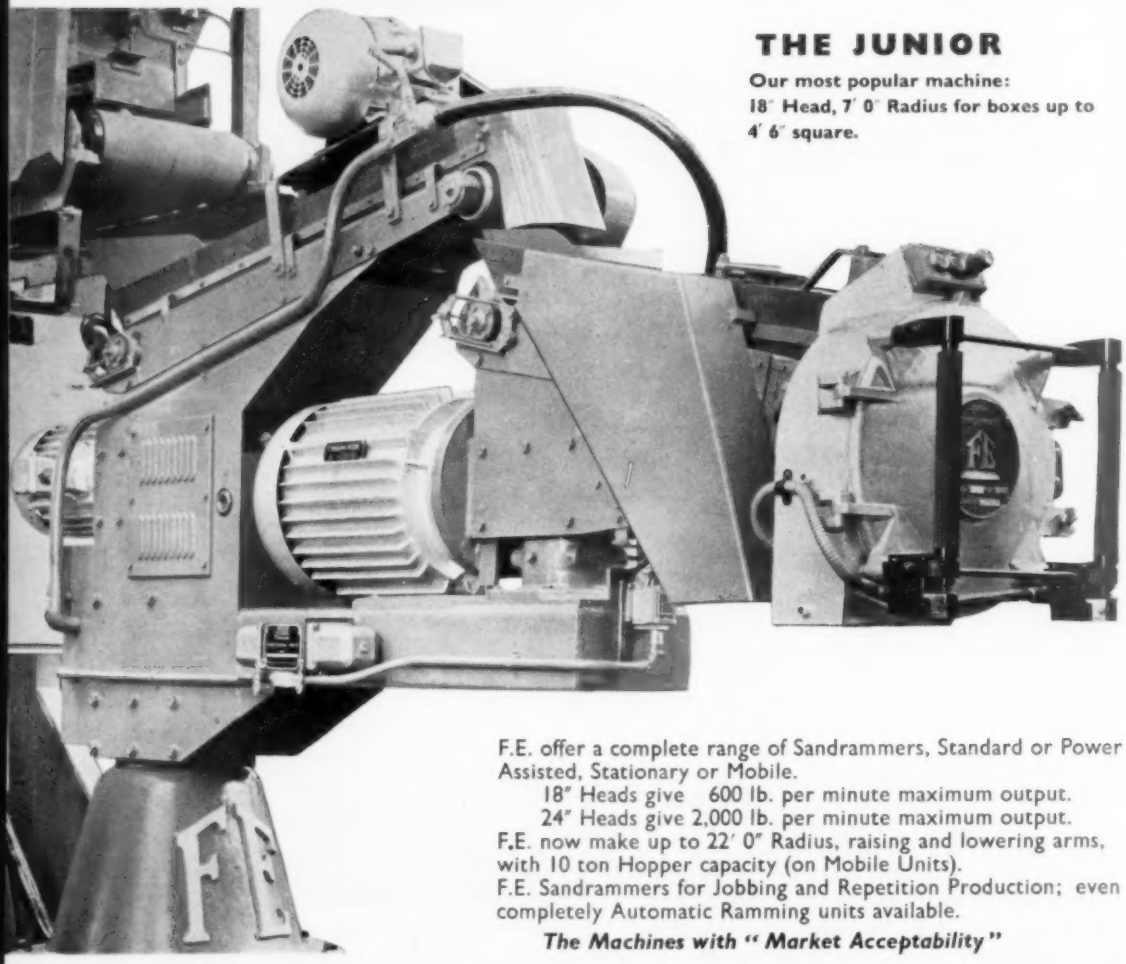

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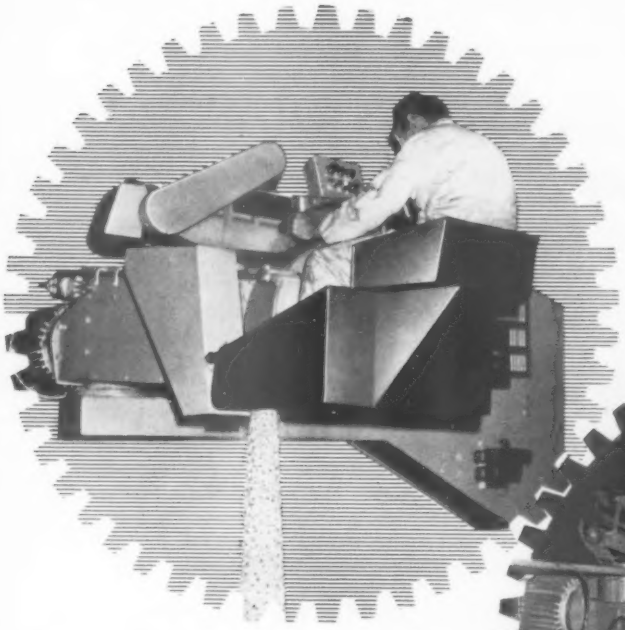

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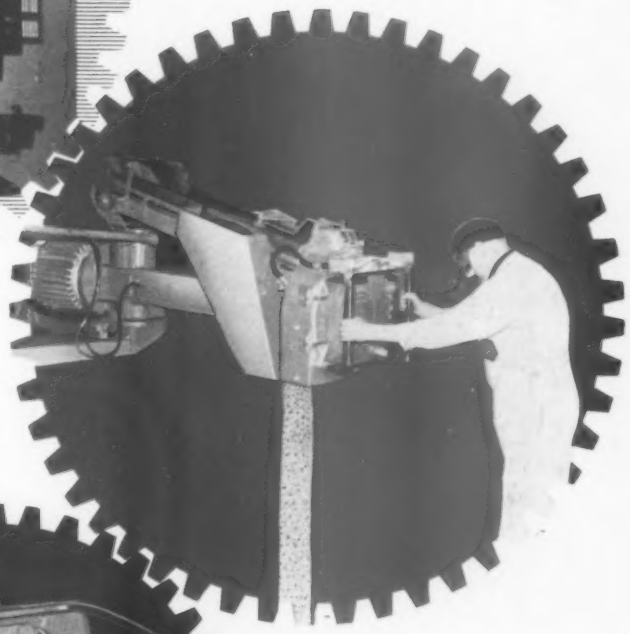

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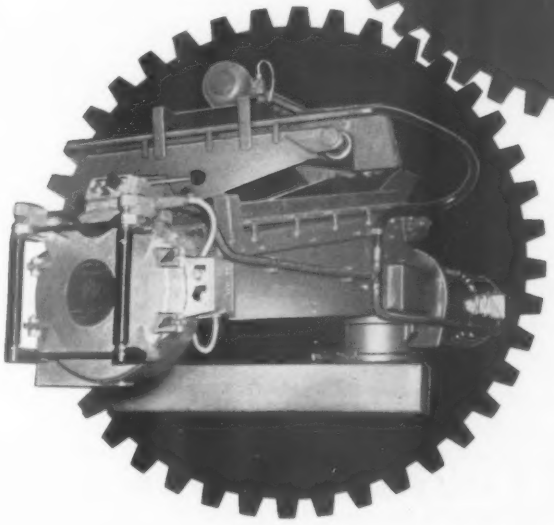

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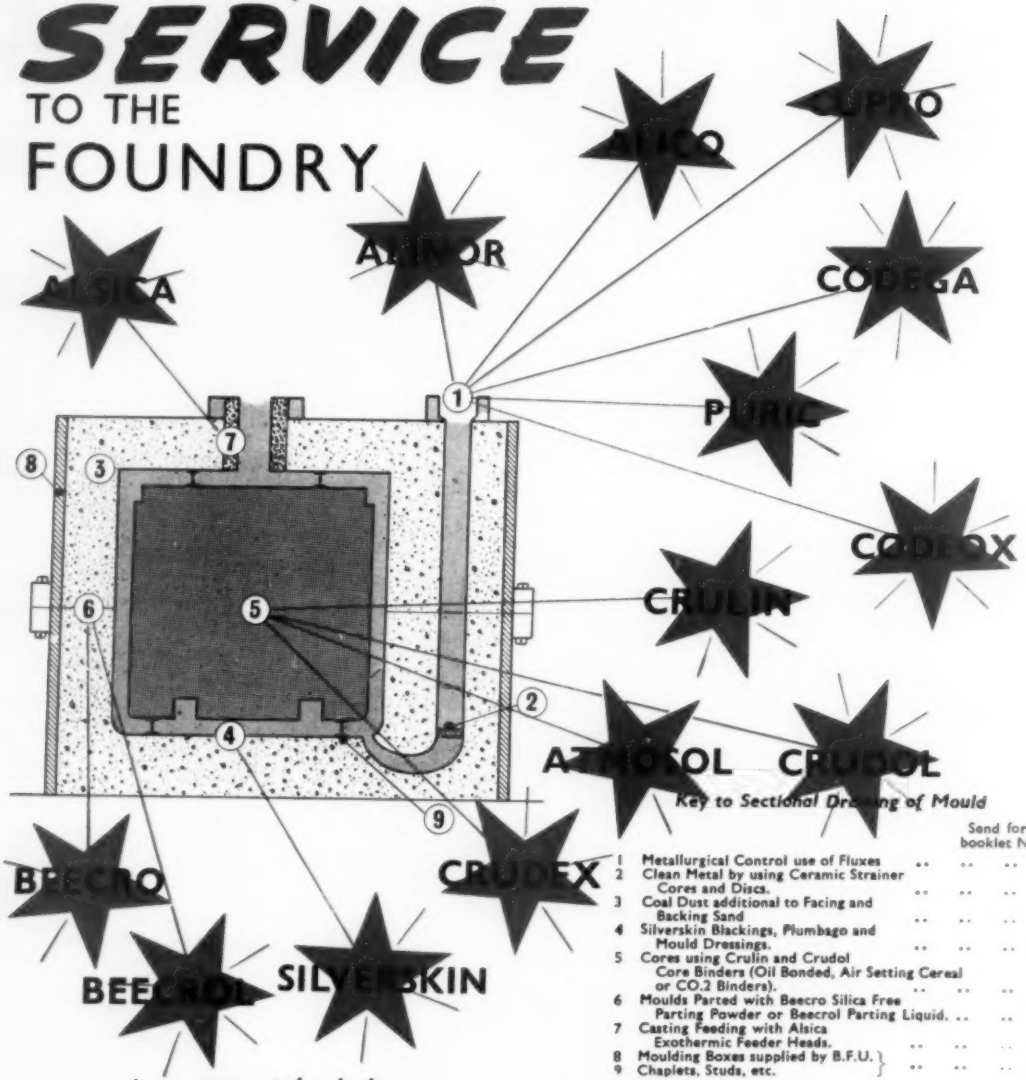

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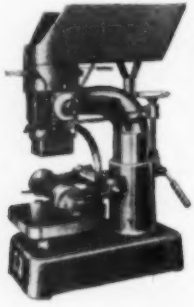

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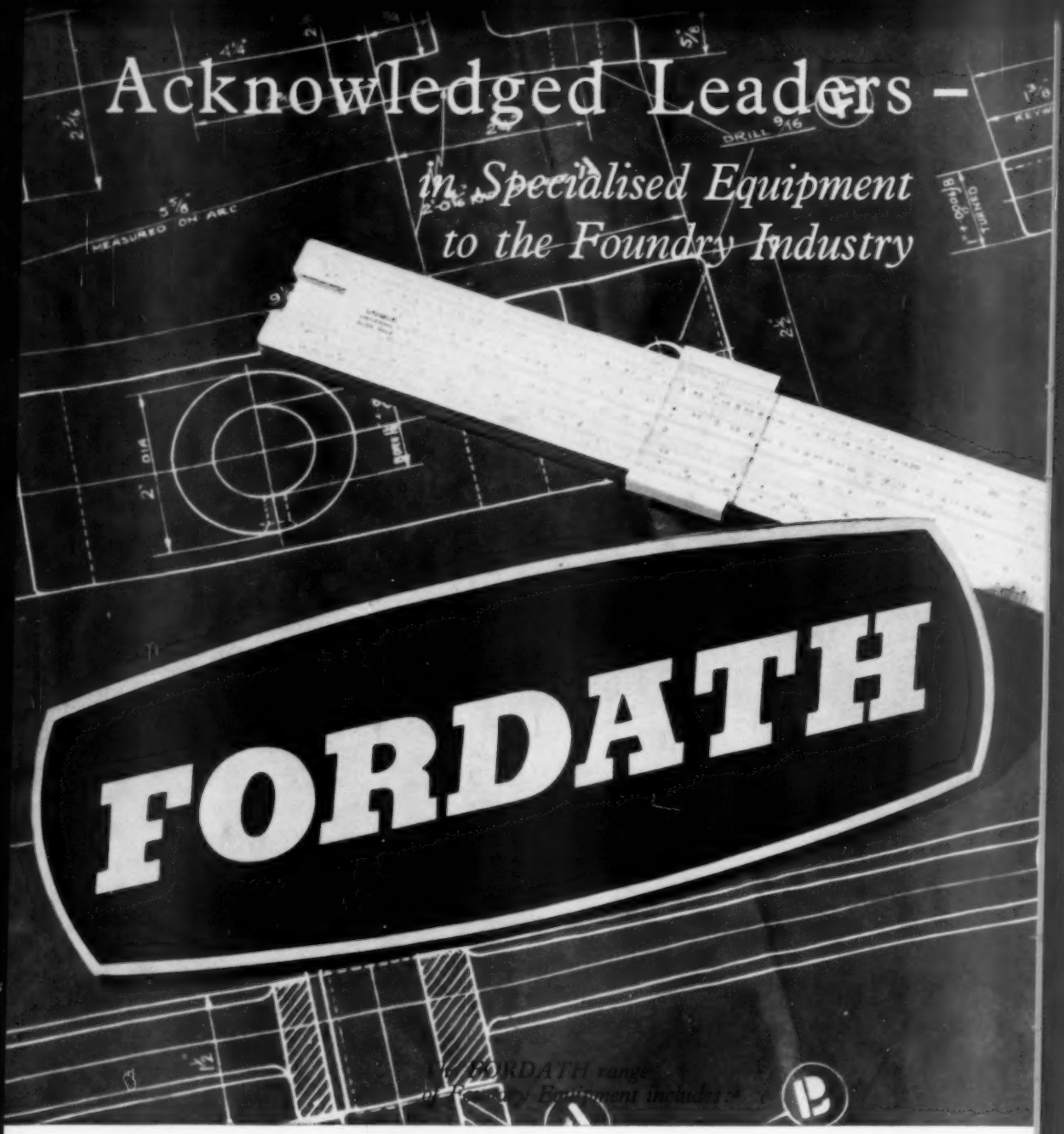

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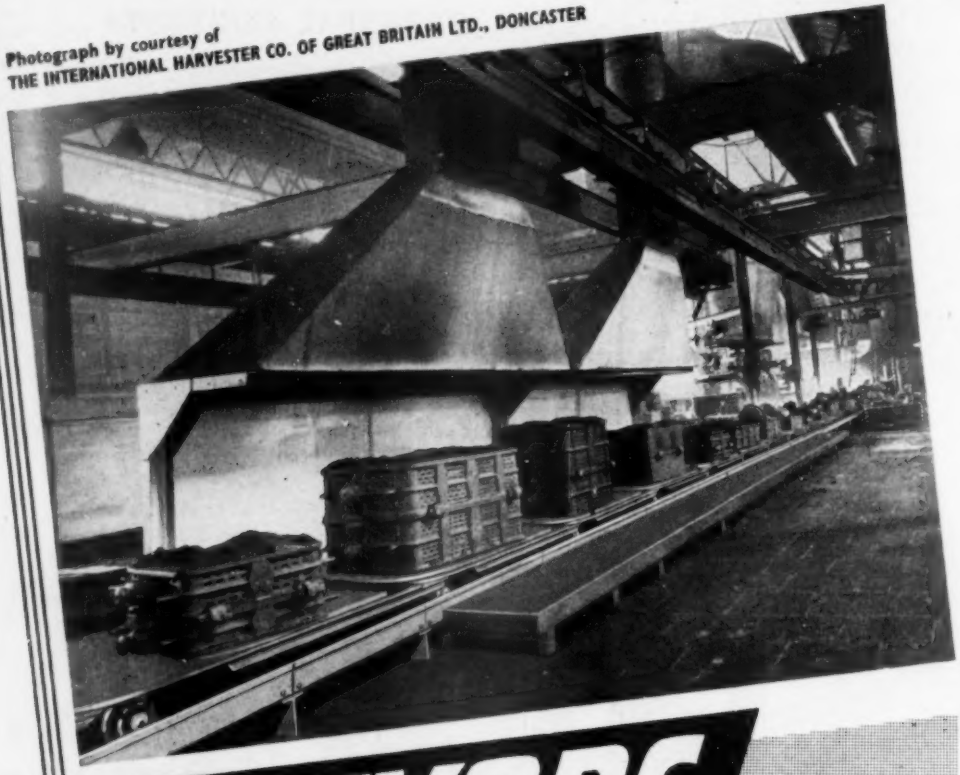

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Cast Your Mind Forward

The slogan "Cast your mind forward" is being used by the Council of Ironfoundry Associations on a recruitment pamphlet available at the exhibition to be held at the Royal Exchange, London, in connection with the Duke of Edinburgh's "Commonwealth Training Week." The slogan is surmounted by a picture of the latest Comet aeroplane in flight and thereby connects the making of castings with the youngest of British national industries. It is an interesting slogan as the association of ideas is not too obvious. This Commonwealth Training Week presents a golden opportunity for the foundry industry to stake its claim amongst the younger generation for service within the industry. The London effort referred to is but one amongst many, for reports reach us that all over the country events are being organized to show locally the efforts that are in existence to give enlightened training to entrants to industry.

In some cases, actual foundry organizations are assuming responsibility for suitable events, whilst in others, it is the local Chamber of Commerce which is taking the lead. In the latter event, it is incumbent upon local foundry owners to participate. This can be done by opening their works for inspection by parties of young people or by co-operating in any exhibition which may be staged. The major objective—so far as we can see—is to show the world the efforts that are being made throughout the Commonwealth, so to train boys and girls that they acquire high-grade technical skill and become good citizens.

There is, however, the more practical aspect and that is the recruitment of personnel into industry. Whilst there are available at the Youth Employment Centres pamphlets describing some of the various skilled jobs within the foundry industry, these can be supplemented as occasion demands by brochures and leaflets issued by the Council of Ironfoundry Associations. The time is now ripe for the foundry groups to take advantage of the unremitting work put into this subject by its Training Committee over a number of years. They can do so by applying to the CFA training officer who will advise them as to what is available. To reap full benefit from the Commonwealth Training Week the foundry industry and its leaders should be imbued with the implication of the slogan—"Cast your mind forward".

Correspondence

To the Editor of the FOUNDRY TRADE JOURNAL

SKILL WHERE IT'S NEEDED

SIR,—I read with considerable approval, the letter printed in the March 9 issue of the JOURNAL under the above heading, from Mr. W. H. Bond.

The engineering industry as a whole, is gradually realizing the inherent skill of the loose-pattern moulder, but it is an "up-hill" process, and I think every foundry employer producing loose-pattern-moulded castings will readily admit that the reward both he and his employee secure by producing such castings is still insufficient to give the employer the right return for the expenses and taxation he has to meet, or the employee for his "know-how."

Similarly, there are still "tied" foundries whose true costs are concealed by their attachment to another industry, and which undertake outside work as a "side line" at unrealistic prices. Again, many engineering buyers still think that the cheapest price is what matters in buying castings.

There is a world of difference between buying cheap castings and buying castings cheaply, and if some engineers would obtain the final cost of a casting after final machining, taking into consideration the scrap percentage, etc., they would very quickly find that some of these so called "cheap" castings have cost their organization many times more than if, in the first place, they had purchased them intelligently at a fair and reasonable price from a reputable foundry.

Mr. Bond is quite right when he says that the loose-pattern foundry is more truly representative of the foundry industry—as a major industry, and a basic one, and if all consumers of castings would co-operate with those who produce their castings, everyone would benefit.

It is still quite difficult to explain to engineers and engineering buyers that unless sound, accurate and well-constructed patterns are provided, they cannot expect to obtain sound and accurate castings.

The industry has been through a very difficult period for many years, but it does seem that it is slowly correcting itself. However, as castings become more intricate, the standard of skill required to produce them is rising, and the total number of founders able to handle such requirements is steadily decreasing, as is unfortunately, the number of skilled men with the right "know how," born of long experience.

Once again, congratulations to Mr. Bond for putting facts so clearly, and let us all hope that casting users and casting producers will learn more rapidly to co-operate together to their mutual advantage.

Yours, etc.,

C. REYNOLDS,
Director.

Newcast Foundries, Limited,
Silverdale, Newcastle-under-Lyme, Staffs.
March 14, 1961.

To the Editor of the FOUNDRY TRADE JOURNAL

AMERICAN AUTOMOBILE-ENGINE TRENDS

SIR,—I always read with considerable interest the the FOUNDRY TRADE JOURNAL. I feel, however, that some qualifying remarks are in order for the article appearing on page 239 of the February 23 issue entitled, "American Automobile-Engine Trends."

Although the article is an accurate account of the various papers presented at the American Society of Automotive Engineers' meeting on January 9, it is possible for a reader, not familiar with the situation, to arrive at some incorrect conclusions. Specifically, the engine developments of the various companies are repeatedly identified as aluminium engines but in the discussion of the Pontiac Tempest engine, the fact that the engine is made of grey iron is not specifically mentioned . This failure correctly to identify the engine material is also characteristic of the original publication by Charles and McKeller.

As an engineering material for the motoring public, grey iron has proved highly satisfactory and successful. Much of the reason for changing to aluminium engines is hinged around certain manufacturing costs rather than material deficiencies. As a matter of fact, virtually all the aluminium engines have cast-iron cylinder-liners. I might point out that the Ford Falcon engine is grey iron and the Ford company has publicly stated that with proper design they have seen no advantage in the use of aluminium as an engine material.

Although aluminium is being promoted in the interest of saving weight, a properly designed grey-iron engine is not much heavier than an aluminium-block engine. Whilst not stated publicly, there have been enough comments of a reliable nature which indicate that the automobile companies are halting further exploitations of aluminium for engines until they have had an opportunity to evaluate the operations of the current product.

I thought it only fair that in describing a new engine development, the Pontiac reference could at least have mentioned that the four-cylinder Tempest engine was a grey-iron engine block. Yours, etc.

D. E. KRAUSE,
Technical Director.

Gray Iron Research Institute,
Columbus 12, Ohio, USA.
March 15, 1961.

Latest Foundry Statistics

Steel Castings: The February issue of *Monthly Statistics*, published jointly by the Iron and Steel Board and the British Iron and Steel Federation, reports that there was a decrease in the number of people engaged in steelfounding when the census was taken on January 7. It then stood at 18,650 which is 230 fewer than on December 10, 1960, but 880 higher than a year ago. The weekly average output of steel castings during January was estimated at 6,000 tons. This quite high average gives a good send-off for the new year.

Copper-base Castings: The *Bulletin* of the British Bureau of Non-Ferrous Metal Statistics reports that the output of copper-base castings in January this year was 7,655 tons, an increase of 544 tons over the 7,111 tons produced in the corresponding month of last year.

ABBF Meeting: A meeting of Midland area members of the Association of Bronze & Brass Founders is to be held at the Victoria Hotel, Wolverhampton, on March 29, commencing 11.30 a.m., with luncheon at 1 p.m. The business of the meeting will be dealt with at the morning session, and after luncheon Mrs. Collingridge, personnel management advisor at the Ministry of Labour, will give a talk on "Industrial Relations." Arrangements for the Foundry Art and Craft Exhibition to be held in Birmingham University from June 20 to 22 will also be discussed.

Desulphurization of Cast Iron . . .

. . . by Electrolyzing Slag*

It is difficult to overestimate the rôle of cast iron as a cornerstone of any industrial society and the technical limitations on its most economic production constitute a continual challenge to the foundry industry. The cupola as the basic producing-unit has an inherent disadvantage in the introduction of sulphur into the melt as a deleterious impurity that precludes the application of cast iron to a wide field of engineering, and restricts it from radically improving its physical properties. Particularly, the widespread use of the cupola in the production of s.-g. iron offers an attractive but as yet unattainable prospect. It is not surprising that this article, that appears to be an interesting and serious contribution to the solution of this problem should emanate from a country that has recently gained considerable publicity from the rapid proliferation of its " backyard " foundries.

Desulphurization of cast iron by the process of electrolysis was first proposed by Ecen[5] and Yuan Shuan[6]. The experimental results obtained by these Authors showed that efficient desulphurization could be achieved by electrolysis using d.c. power with slag as anode and molten iron as cathode. Furthermore, Yuan Shuan had obtained spheroidal-graphite structure in high-carbon content iron by applying the above mentioned process. The present paper studies this electrolysis process in greater detail.

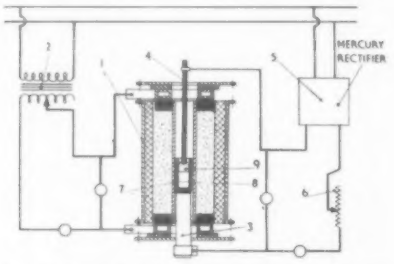

FIG. 1.—*Schematic diagram of the furnace used to carry out the experiments.*

Key:—1. High temperature carbon furnace. 2. Transformer (20 kva). 3. Graphite electrode. 4. Carbon electrode (dia. 10 mm). 5. Mercury rectifier. 6. Variable resistance. 7. Graphite crucible (inner dia. 40 mm.). 8. Holder. 9. Molten slag.

Experimental Technique

The experimental arrangements are shown in Fig. 1 and the experimental procedure was as follows:—When the circuit was connected (3) in Fig. 1 was put to the bottom of the carbon furnace. Heat was applied until the furnace wall reached approximately 1,600 deg. C. 100 gm. of slag was put into the graphite crucible and was heated until the slag had melted. Molten iron was then poured in. The carbon electrode (4) was put in position and the current was switched on. During electrolysis a steady temperature of approximately 1,500 deg. C. was maintained. The constituents of iron and slag used in the experiments are listed in tables 1 and 2. Some of the slags used were made artificially, while others were produced in industry.

Desulphurization

Slag Basicity

From test results plotted in graph 2, it can be seen that the percentage of desulphurization is directly proportional to the basicity of the slag, and the sulphur and carbon content in the iron. The relation between the percentage of desulphurization and carbon content can be seen from table 3. (The tvpe of iron and slag used, the voltage and current applied in different groups of experiments, are written below the corresponding graphs.)

Current Density

Current density is defined as the total amount of current passing through per unit area of the molten iron. The experimental results are shown in graphs 3, 4, and 5, from which it can be seen that there is

TABLE 1.—*Composition of Cast Iron.*

No.	Composition, per cent.				
	C	Si	Mn	P	S
A	2.50	1.30	0.40	0.15	0.72
B	2.55	6.29	0.60	—	0.019
C	1.97	1.03	0.03	0.275	1.10
D	3.60	1.98	0.09	0.221	0.065

TABLE 2.—*Composition of Slag.*

No.	Chemical composition, per cent.				Source.
	SiO_2	CaO	MgO	Al_2O_3	
1	31.5	32.00	—	13.8	Slag of acid converter.
2	26.00	12.77	10.21	—	Slag of electric furnace.
3	24.25	19.65	—	—	
4	15.62	28.70	—	10.8	Slag of basic converter.
5	35.00	50.00	15.00	—	Artificial.
6	—	—	—	—	Artificial.

* Report of the Northeast Institute of Technology's Institute of Foundry Practice, Chinese People's Republic.

Correspondence

To the Editor of the FOUNDRY TRADE JOURNAL

SKILL WHERE IT'S NEEDED

SIR,—I read with considerable approval, the letter printed in the March 9 issue of the JOURNAL under the above heading, from Mr. W. H. Bond.

The engineering industry as a whole, is gradually realizing the inherent skill of the loose-pattern moulder, but it is an "up-hill" process, and I think every foundry employer producing loose-pattern-moulded castings will readily admit that the reward both he and his employee secure by producing such castings is still insufficient to give the employer the right return for the expenses and taxation he has to meet, or the employee for his "know-how."

Similarly, there are still "tied" foundries whose true costs are concealed by their attachment to another industry, and which undertake outside work as a "side line" at unrealistic prices. Again, many engineering buyers still think that the cheapest price is what matters in buying castings.

There is a world of difference between buying cheap castings and buying castings cheaply, and if some engineers would obtain the final cost of a casting after final machining, taking into consideration the scrap percentage, etc., they would very quickly find that some of these so called "cheap" castings have cost their organization many times more than if, in the first place, they had purchased them intelligently at a fair and reasonable price from a reputable foundry.

Mr. Bond is quite right when he says that the loose-pattern foundry is more truly representative of the foundry industry—as a major industry, and a basic one, and if all consumers of castings would co-operate with those who produce their castings, everyone would benefit.

It is still quite difficult to explain to engineers and engineering buyers that unless sound, accurate and well-constructed patterns are provided, they cannot expect to obtain sound and accurate castings.

The industry has been through a very difficult period for many years, but it does seem that it is slowly correcting itself. However, as castings become more intricate, the standard of skill required to produce them is rising, and the total number of founders able to handle such requirements is steadily decreasing, as is unfortunately, the number of skilled men with the right "know how," born of long experience.

Once again, congratulations to Mr. Bond for putting facts so clearly, and let us all hope that casting users and casting producers will learn more rapidly to co-operate together to their mutual advantage.

Yours, etc.,

C. REYNOLDS,
Director.

Newcast Foundries, Limited,
Silverdale, Newcastle-under-Lyme, Staffs.
March 14, 1961.

To the Editor of the FOUNDRY TRADE JOURNAL

AMERICAN AUTOMOBILE-ENGINE TRENDS

SIR,—I always read with considerable interest the the FOUNDRY TRADE JOURNAL. I feel, however, that some qualifying remarks are in order for the article appearing on page 239 of the February 23 issue entitled, "American Automobile-Engine Trends."

Although the article is an accurate account of the various papers presented at the American Society of Automotive Engineers' meeting on January 9, it is possible for a reader, not familiar with the situation, to arrive at some incorrect conclusions. Specifically, the engine developments of the various companies are repeatedly identified as aluminium engines but in the discussion of the Pontiac Tempest engine, the fact that the engine is made of grey iron is not specifically mentioned . This failure correctly to identify the engine material is also characteristic of the original publication by Charles and McKeller.

As an engineering material for the motoring public, grey iron has proved highly satisfactory and successful. Much of the reason for changing to aluminium engines is hinged around certain manufacturing costs rather than material deficiencies. As a matter of fact, virtually all the aluminium engines have cast-iron cylinder-liners. I might point out that the Ford Falcon engine is grey iron and the Ford company has publicly stated that with proper design they have seen no advantage in the use of aluminium as an engine material.

Although aluminium is being promoted in the interest of saving weight, a properly designed grey-iron engine is not much heavier than an aluminium-block engine. Whilst not stated publicly, there have been enough comments of a reliable nature which indicate that the automobile companies are halting further exploitations of aluminium for engines until they have had an opportunity to evaluate the operations of the current product.

I thought it only fair that in describing a new engine development, the Pontiac reference could at least have mentioned that the four-cylinder Tempest engine was a grey-iron engine block. Yours, etc.

D. E. KRAUSE,
Technical Director.

Gray Iron Research Institute,
Columbus 12, Ohio, USA.
March 15, 1961.

Latest Foundry Statistics

Steel Castings: The February issue of *Monthly Statistics*, published jointly by the Iron and Steel Board and the British Iron and Steel Federation, reports that there was a decrease in the number of people engaged in steelfounding when the census was taken on January 7. It then stood at 18,650 which is 230 fewer than on December 10, 1960, but 880 higher than a year ago. The weekly average output of steel castings during January was estimated at 6,000 tons. This quite high average gives a good send-off for the new year.

Copper-base Castings: The *Bulletin* of the British Bureau of Non-Ferrous Metal Statistics reports that the output of copper-base castings in January this year was 7,655 tons, an increase of 544 tons over the 7,111 tons produced in the corresponding month of last year.

ABBF Meeting: A meeting of Midland area members of the Association of Bronze & Brass Founders is to be held at the Victoria Hotel, Wolverhampton, on March 29, commencing 11.30 a.m., with luncheon at 1 p.m. The business of the meeting will be dealt with at the morning session, and after luncheon Mrs. Collingridge, personnel management advisor at the Ministry of Labour, will give a talk on "Industrial Relations." Arrangements for the Foundry Art and Craft Exhibition to be held in Birmingham University from June 20 to 22 will also be discussed.

Desulphurization of Cast Iron . . .

. . . by Electrolyzing Slag*

It is difficult to overestimate the rôle of cast iron as a cornerstone of any industrial society and the technical limitations on its most economic production constitute a continual challenge to the foundry industry. The cupola as the basic producing-unit has an inherent disadvantage in the introduction of sulphur into the melt as a deleterious impurity that precludes the application of cast iron to a wide field of engineering, and restricts it from radically improving its physical properties. Particularly, the widespread use of the cupola in the production of s.-g. iron offers an attractive but as yet unattainable prospect. It is not surprising that this article, that appears to be an interesting and serious contribution to the solution of this problem should emanate from a country that has recently gained considerable publicity from the rapid proliferation of its "backyard" foundries.

Desulphurization of cast iron by the process of electrolysis was first proposed by Ecen[3] and Yuan Shuan[6]. The experimental results obtained by these Authors showed that efficient desulphurization could be achieved by electrolysis using d.c. power with slag as anode and molten iron as cathode. Furthermore, Yuan Shuan had obtained spheroidal-graphite structure in high-carbon content iron by applying the above mentioned process. The present paper studies this electrolysis process in greater detail.

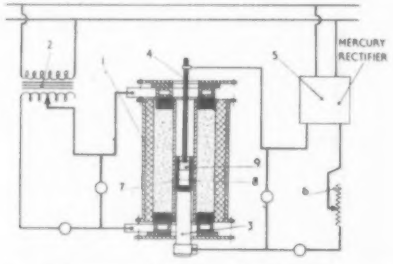

FIG. 1.—*Schematic diagram of the furnace used to carry out the experiments.*

Key:—1. High temperature carbon furnace. 2. Transformer (20 kva). 3. Graphite electrode. 4. Carbon electrode (dia. 10 mm). 5. Mercury rectifier. 6. Variable resistance. 7. Graphite crucible (inner dia. 40 mm.). 8. Holder. 9. Molten slag.

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Desulphurization

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From test results plotted in graph 2, it can be seen that the percentage of desulphurization is directly proportional to the basicity of the slag, and the sulphur and carbon content in the iron. The relation between the percentage of desulphurization and carbon content can be seen from table 3. (The type of iron and slag used, the voltage and current applied in different groups of experiments, are written below the corresponding graphs.)

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* Report of the Northeast Institute of Technology's Institute of Foundry Practice, Chinese People's Republic.

an optimum-current density. Graphs 4 and 5 show that this optimum density is independent of the type of slag used.

Time of electrolysis

From the results plotted in graphs 6 and 7, it can be seen that the percentage of desulphurization is directly proportional to the time.

Voltage

From the results plotted in graph 8 it can be seen that provided that the current is steady, an increase in voltage will cause an increase in the percentage of desulphurization.

TABLE 3.—*The Effect of Carbon Content on the Percentage of Desulphurization.*

Test No.	Basicity of slag.	Carbon per cent.	Sulphur content before desulphurization, per cent.	Sulphur content after desulphurization, per cent.	Percentage of desulphurization,
52	1.10	3.47	0.065	0.021	68
53		4.05	0.065	0.018	72
51	1.34	3.61	0.065	0.018	72
59		4.70	0.062	0.014	77
60	1.35	4.21	0.056	0.030	46
63		3.70	0.062	0.053	14
57	1.40	4.37	0.058	0.018	69
58		4.44	0.058	0.014	76

N.B.—Due to low temperature in test numbers 60 and 63, the viscosity of the slag was high, and the results were poor.

Theory of Desulphurization

The following analysis is based on the assumption that molten slag consists of ions only, and that complex molecules do not exist. This assumption has been proved correct by many people.[10, 11] Ecen thought that the reaction $S_{Fe} + 2e = S^{2-}$ was the most probable cathode reaction, for this reaction has the biggest standard-electrode-potential.

Reactions.	E° 1,500 (volt).
$Ca^{2+} + 2e = Ca$	− 2·23
$Mg^{2+} + 2e = Mg$	− 1·98
etc.	
$Fe^{3+} + e = Fe^{2+}$	− 0·31
$S_{(Fe)} + 2e = S^{2-}$	− 0·18

The sulphur in the iron moved into the slag and existed in ionized form. Ecen thought that the possibility for Ca^{2+} and Mg^{2+} in the slag to obtain electrons from the cathode was very slight. He pointed out that the desulphurization process was closely related to the formula:

$$L_{FeS} = \frac{A_{S^{2-}} \cdot A_{Fe^{2+}}}{A_S \cdot A_{Fe}}$$

During electrolysis, Fe^{2+} in the slag passed into the iron. Hence A_{Fe} was increased and $A_{Fe^{2+}}$ decreased. To maintain equilibrium, A_S was decreased and $A_{S^{2-}}$ was increased. That is to say that the sulphur in the iron had moved into the slag and had become sulphur ions. In other words, the reaction $S_{Fe} + 2e = S^{2-}$ had occurred.

Further Considerations

The Authors consider that the above explanation is not adequate, in view of the fact that the above

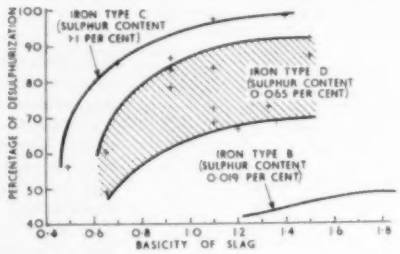

FIG. 2.—*Relationship of the basicity of slag and extent of desulphurization. Test conditions:—Iron Types—B, C, D; slag— Type No. 2 and No. 3 with CaO, CaF_2, SiO_2 and MgO added; basicity is defined as* $\frac{CaO}{SiO_2}$ (*or* $\frac{CaO+MgO}{SiO_2}$); *voltage*— 3.5 to 4.0 *volt.; current density*—0.4 *amp. per sq. cm.; time*—30 *min.*

mentioned reaction is not the unique reaction. Reduction of calcium and magnesium ions existing in the slag are also possible reactions in the molten

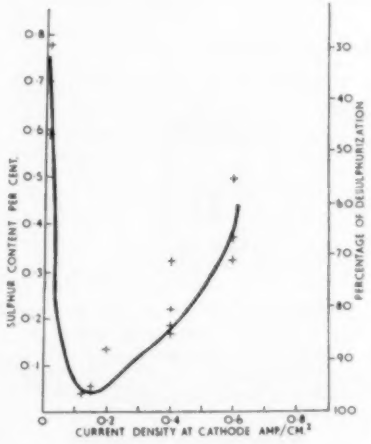

FIG. 3.—*Effect of current density on the degree of desulphurization. Test conditions:—Iron—Type C, sulphur content* 1.1 *per cent.; slag— No.* 6 (90 *gm. of No.* 6 *slag plus* 10 *gm. of* CaF_2); *voltage*—5 *volt.; time*—30 *min.; current density*—0 to 0.6 *amp. per sq. cm.*

iron during the process of desulphurization. It is suggested that the following reactions also take place and might be represented as follows: $Ca^{2+}{}_{(slag)} + 2e = Ca_{(iron)}$; $Mg^{2+}{}_{(slag)} + 2e = Mg_{(iron)}$; $Ca_{(iron)} + S = CaS$; $Mg_{(iron)} + S = MgS$.

The proof of this is as follows: (1) Although the standard electrode potential of the reaction $Fe^{2+} + 2e = Fe$ is high, the concentration of Ca^{2+} is much higher than the concentration of Fe^{2+}, in the slag. Hence, from the electro-dynamics point of view, the speed of the reaction of $Ca^{2+} + 2e = Ca$, should be much greater than that of the reaction

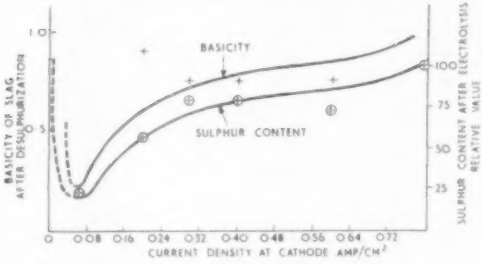

FIG. 4.—*Correlation of sulphur content, basicity of slag, and also current density at cathode. Test conditions:—Iron—Type A (sulphur content* 0.72 *per cent.); voltage—*3.5 *to* 5 *volt.; time—*30 *min.; current density—*0.06 *to* 0.8 *amp. per sq. cm.; slag —basicity* 1.05.

$Fe^{2+} + 2e = Fe$. (2) Furthermore, Yuan Shuan pointed out that during electrolysis, the higher the basicity of the slag, the easier would be the formation of spheroidal-graphite nodules. In such circumstances, the only explanation would be the reduction

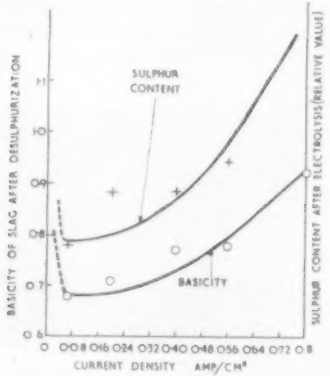

FIG. 5.—*Values corresponding to those in Fig.* 4 *relating to the same experimental conditions but for a slag basicity of* 1.85.

n molten iron of Ca^{2+} and Mg^{2+} ions from the slag. (3) In the Authors' experiments, it was noticed that independent of the current density and time, the changes in the composition of the slag followed the same trend as the changes in the sulphur content of iron (see graphs 4, 5, 7). The greater the reduction in sulphur the lower would be the basicity of slag. Evidently the decrease in basicity could not be caused by the increase of SiO_2 in the slag, since the reaction $Si = Si^{4+} + 4e$ was not involved in the electrolytic process. The only possibility was therefore, as Ecen said, the reduction of Si^{4+}. Hence, the decrease in basicity of the slag during electrolysis was undoubtedly due to the reduction of Ca^{2+} and Mg^{2+} in the iron. (4) In order to determine the most probable cathode reaction, comparison of the standard electrode-potential of different reactions was insufficient. Side effects (such as over-voltage—related to the selection of cathode and current density) could upset the order of reaction as determined by their standard electropotentials. Therefore it is difficult to say that reactions $S_{(Fe)} + 2e = S^{2-}$, or $Fe^{2+} + 2e = Fe$, occurred before reactions $Ca^{2+} + 2e = Ca$, or $Mg^{2+} + 2e = Mg$.

Summary

In brief the mechanism of desulphurization is as follows: Calcium and magnesium ions in the slag due to electrolysis are reduced in the molten iron. Since calcium (or magnesium) atoms have great affinity for sulphur, CaS (or MgS) is formed in molten iron. CaS (or MgS) is completely insoluble in molten iron, and having a smaller specific gravity, it floats to the top and gets back into the slag. When it gets back into the slag, CaS and MgS again ionized into Ca^{2+} (Mg^{2+}) and S^{2-}. The S^{2-} is oxidized in the anode, forming SO_2, which is set free at the surface of the slag. The whole process can be represented by the following formulae:—

$$Ca^{2+}_{(slag)} + 2e = Ca_{(iron)}$$
$$Ca_{(iron)} + S_{(iron)} = CaS_{(iron)}$$
$$CaS_{(iron)} = CaS_{(slag)}$$
$$CaS_{(slag)} = Ca^{2+}_{(slag)} + S^{2-}_{(slag)}$$
$$S^{2-}_{(slag)} - 2e = S$$
$$S + O_2 = SO_2 \uparrow$$

Contradiction

From the foregoing it is evident that calcium is only an "intermediate" agent. There is, however, a contradictory point. If desulphurization does occur according to the above formulæ, then the calcium would be circulating between the iron and the slag. Hence the decrease in basicity of the slag as mentioned above should not occur. The explanation is as follows: (1) When the sulphur content is low in iron, some of the calcium atoms no longer combine with sulphur, but will act as a graphitizing agent. In the preliminary experiments carried out completely-graphitized structures have not yet been obtained. This may be due to the large amount of carbon continuously dissolving into the molten iron from the graphite crucible. Hence the amount of calcium existing becomes insufficient to graphitize the carbon. But in some of the tests graphitization had already started (see Fig. 9). This type of graphite-structure may be found in practice where insufficient graphitization agent is present. (2) The decrease in basicity may also be due to the fact that some of the CaS, having smaller grain sizes, does not float up in

time. Hence the number of calcium ions in the slag remains low. (3) When electrolysis is in a violent state, some of the calcium atoms have no time to enter the molten iron. They exist in gaseous form between the slag and the molten iron. So, it becomes impossible for the slag to regain its original amount of calcium. When this happens (*i.e.*, when electrolysis is in a violent state) desulphurization is also proceeding vigorously. Therefore, it gives the impression that a high percentage of desulphurization corresponds to a lower basicity. Yuan Shuan holds similar views on this point.

Consideration of Results

Basicity and Desulphurization

It is difficult to explain the effect of basicity on the percentage of desulphurization, using Ecen's theory. According to this theory the calcium and magnesium do not interfere with the process of electrolysis. However, the suggested theory does offer an explanation of this phenomenon. In the slag of high basicity, the concentration of Ca^{2+} and Mg^{2+} is high, hence in electrolysis more Ca^{2+} and Mg^{2+} will enter into the molten iron and form calcium and magnesium atoms. Hence the reactions $Ca + S = CaS$ and $Mg + S = MgS$ are more intense, and a higher percentage of desulphurization occurs.

Carbon Content

A high-carbon content in the iron gives a higher percentage of desulphurization. Ecen's explanation is that carbon increases the activity of sulphur. Since $Ca + S = CaS$, an increase in A_S will inevitably cause the reaction to proceed to the right, hence a more complete desulphurization can occur.

Sulphur

The relationship between the sulphur content in the iron and the percentage of desulphurization is the same as above. An increase in the concentration of sulphur raises A_S, and will cause the reaction $Ca + S = CaS$ to proceed to the right. Hence the percentage of desulphurization is raised.

Voltage

The percentage of desulphurization would be increased with the increase in the voltage applied. An increase in voltage, increases the driving force which moves the calcium or magnesium atoms from the slag into the molten iron. Hence desulphurization would be more complete. (But after the voltage has reached an optimum value, the effect of any increase in the driving force will be less.) Meanwhile the current must be steady. In the experiments it was often noticed that the unusual condition of the percentage of desulphurization decreasing with an increase in the voltage applied. For after the voltage was increased to maintain a constant current density, the resistance between the two poles must be increased. In other words, the anode had to be raised so that the thickness of the slag layer lying between the anode and the molten iron surface was increased. When the voltage was greatly increased, the anode had to be raised until its contact surface with the slag was very small. At this stage, current was no longer steady and the results of desulphurization were very poor. With the increase in voltage, the unsteadiness in current increased and the percentage desulphurization was lowered.

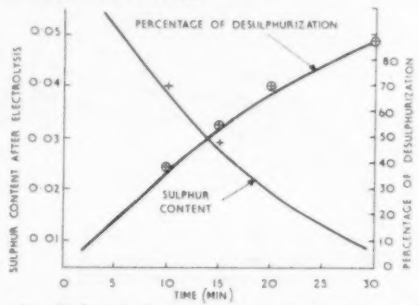

FIG. 6.—*Relation between time and percentage of desulphurization for iron type D. Test conditions:—Iron—Type D (sulphur content 0.065 per cent.); slag—90 gm. of No. 5 slag with basicity 1.85 plus 10 gm. of CaF_2; voltage—7 volts. current density—0.9 to 1.0 amp. per sq. cm.*

Parameters

In practice, the parameters in electrolysis can best be chosen in the following way. Firstly, the current density is determined by the required percentage of desulphurization, (Fig. 3). From this value can be calculated the absolute amount of current required. The maximum voltage which can maintain a steady current is then determined. This appears to be the best way to obtain the most efficient electrolytic process.

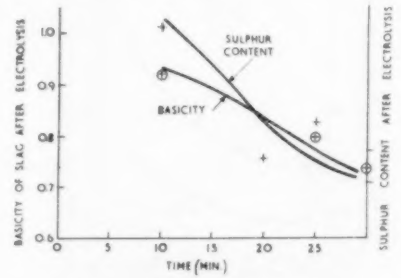

FIG. 7.—*Duration of electrolysis is here related to basicity of slag and sulphur content. Test conditions:—Iron—Type A (sulphur content 0.72 per cent.); slag—80 gm. of slag No. 4; basicity 1.85, plus 20 gm. of CaF_2; voltage—3.5 to 5 volt.; current density—0.4 amp. per sq. cm.*

Current Density

The present experimental results do not agree with Ecen's theory, which stated that the higher the current density, the better would be the extent

of desulphurization. Their conclusion is that a higher current density produces a poorer result. The fact that the distance between the two poles was not fixed might have affected this conclusion. Other than this, the explanation is similar to that of Yuan Shuan. If the current is very large, elec-

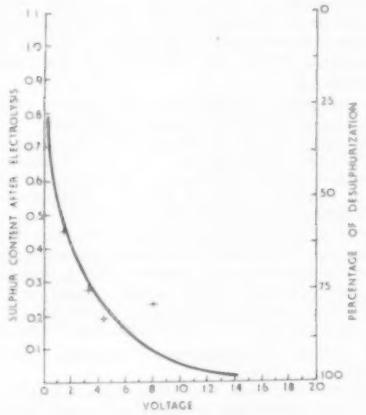

FIG. 8.—*Variation of the percentage of desulphurization with changes in the voltage. Test conditions:—Iron—Type C (sulphur content 1.1 per cent.); slag—90 gm. of No. 6 slag plus 10 gm. of CaF_2; current density—0.4 amp. per sq. cm.; time——30 min.*

trolysis will be in a very violent state. A thin oxygen layer is formed on the surface of the anode, and a calcium-gas layer is formed on the surface of the molten iron. Resistance is therefore increased

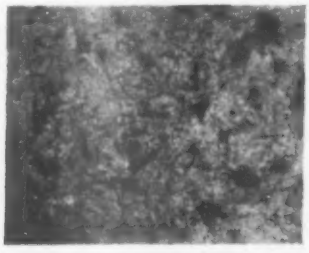

FIG. 9.—*Graphite structure where experimental conditions do not permit adequate graphitization. Structure of graphite (×100) after electrolysis at the 50th test. Test conditions:—Iron—Type D slag —72 per cent. of No. 1 slag plus 20 per cent. MgO and 8 per cent. of CaF_2; current density—0.4 per sq. cm.; voltage—5 volts. time—30 min.*

and the percentage of desulphurization is lowered. Besides this, an increase in the electrode potentials may also be a cause of the decrease of the percentage of desulphurization. But this decrease in current density has its limitations, and it cannot be presumed that the highest percentage of desulphurization can be obtained at zero current density (or open circuit), as this process is also governed by Faraday's law. Therefore when current density is lowered to a certain stage, the curve would change direction rapidly, that is, the percentage of desulphurization would be very much lowered.

Current Direction

Some workers in China are of the opinion that a.c. current can be used. This is very erroneous as it contradicts the basic principles of electrochemistry. Pobolechki and his colleagues have clarified this point recently.

Economical Factor

The electrolytic process may be compared in respect of cost with the calcium-carbide-injection procedure and the procedure using magnesium as the desulphurizing agent. According to Baumer and Hulme[13], the consumption of CaC_2 in the calcium-carbide-injection method is 10 to 12 times the amount of sulphur removed. Assume that iron containing 1.1 per cent. sulphur is required to have it reduced to 0.08 per cent., then the amount of CaC_2 required to desulphurize 1 metric ton of this iron is:—

1,000 (1.1 per cent.-0.08 per cent.) by 12 = 122.4 kg. which would involve a cost of 183.6 Chinese dollars per ton. When magnesium is used as the desulphurizing agent, the amount of magnesium required can be estimated by the following formula: Mg per cent. $=0.76\ (S_1-S_2)/A$; where S_1 and S_2 denote respectively the sulphur content in iron before, and after desulphurization. A is the absorption rate of magnesium in iron. If A is 50 per cent, the quantity of magnesium required would be 15.5 kg. per ton of iron. If A is 100 per cent., the quantity would be 7.6 kg. per ton of iron. The cost in this case would be 60.8 and 30.4 Chinese dollars per ton.

In the electrolytic process, only electricity is consumed. In present circumstances, the expenditure is only 2.56 Chinese dollars per metric ton of iron. Clearly the electrolytic process is the cheapest method.

Conclusions

(1) Desulphurization by the electrolytic process is an efficient method and the cheapest to operate. It is especially suitable for cast iron having a high sulphur content. This method can attain a higher percentage of desulphurization (up to 97.5 per cent.) which cannot be reached by any other method. (2) High basicity in slag is good for desulphurization. (3) The higher the carbon content of the iron, the higher will be the percentage of desulphurization. (4) There is an optimum current density. (5) Provided that the current is steady an increase in the electrode potentials between the two

Desulphurizing Cast Iron by Slag Electrolysis

poles may increase the percentage of desulphurization. (6) The percentage of desulphurization increases with an increasing period of electrolysis.

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Metallurgical Abstracts

Descriptions of metallurgical patents given below have been taken from details published in the Official Gazette of the United States Patent Office.

Pipe-moulding Machine and Method

A pipe-moulding machine includes means for forming a sand mould in a hollow cylindrical flask. Provision is made for supporting the flask with its longitudinal axis in a substantially horizontal plane, there being also a substantially cylindrical and co-extensive pattern member for extending coaxially of the flask in spaced relation to its inner wall and coacting therewith to form an annular elongated sand receiving and shaping chamber. Means provide for imparting relative longitudinal movement to the pattern member to position it in and withdraw it from the flask. A coaxial pattern element extends through one end of the flask into mating engagement with the pattern member, provision being made for directing sand under air pressure into the annular chamber endwise around the pattern element, and for permitting air to escape from the chamber while retaining sand therein so as to fill the chamber with packed sand. The pattern element has a stationary portion forming a portion of the shaping chamber and carrying a portion of enlarged diameter forming an internal shoulder on the sand mould, the enlarged portion being movable outwardly and longitudinally of the flask relative to the stationary portion of the pattern element upon engagement by the inwardly moving pattern member. Means provide for moving the enlarged portion inwardly of the flask upon the outward movement of the pattern member whereby its enlarged diameter compacts the shoulder of the sand mould.—2,948,933.

Process of Making Refractory Shell for Casting Metal

A process for making a refractory shell into which molten metal may be cast, involves forming a multi-layer shell around an expendable pattern, comprising the steps of coating the pattern at least twice with a slurry containing a silica binder and refractory powders, applying a stucco of coarse refractory material to the slurry deposited on the pattern after each slurry coating and applying to each stucco coat a dry alkaline binder material and thereafter removing the pattern from the shell and firing the shell.—2,948,935.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

837,588. Die Casting Machine Tools, Limited, and A. R. Mills, River Works, 152, Green Lanes, Palmers Green, London, N.13.

Improvements in die-casting machines. Vacuum-die-casting can be carried out by the methods patented without any substantial modification of an existing machine apart from the addition of the necessary further units.

837,632. Imperial Chemicals Industries, Limited, Imperial Chemical House, Millbank, London, S.W.1, and R. L. P. Berry, 28, Weymoor Road, Harbourne, Birmingham, 17, A. D. Busby, 42, Bleakhill Road, Erdington, Birmingham, 23, and D. V. Badger, "Castel Froma," Lillington Road, Leamington Spa, Warwicks.

A method of semi-continuously casting metals in which an arc is struck between a consumable electrode of the metal to be melted, and a water-cooled annular metal hearth. The molten metal so formed passes through an aperture in the hearth into a water-cooled ingot-mould of a semi-continuous machine.

837,759. Clark Equipment Company, Buchanan, Michigan, USA.

A method and apparatus (the main claim is for a corebox) for moulding a one-piece core which may be used in the casting of articles or parts having back-drafts.

838,005. Union Carbide Corporation, 30 East 42nd. Street, New York, USA.

An improved method and treating agent for desulphurizing a bath of molten metal. A stream of gas, such as nitrogen, laden with comminuted calcium carbide is injected into the bath. The calcium carbide is previously mixed with oil in the amount of 0.25 to 4 per cent. by weight of the calcium carbide.

838,050. O. Emblam, "Cherrybridge," 107, Rainford Road, St. Helens, Lancs. Application proceeded under the name of Colin Stewart, Limited, Central Offices, Wharton Hall, Winsford, Cheshire.

Improvements in, or relating to, shell moulds. The dry composition claimed comprises a refractory (or a mixture of one or more refractory materials having widely differing particle sizes and selected from the group: silica, zircon, zirconia, alumina, sillimanite, mullite, kyanite, andalusite, calcined kaolin, magnesia, periclase, forsterite and fireclay grog). A high-temperature binder is used, which is comprised of at least one substance from the group: the silicates of sodium and potassium, sodium silica-fluoride, the alkali metal fluorides, the alkali metal and ammonium phosphates, microcosmic salt, the alkali metal borates and tetraborates, boric acid, boric oxide, precipitated calcium fluoride, and cryolite. A low-temperature synthetic-resin binder is also employed.

838,436. J. S. Hoekstra, van 't Haaffstraat 30, Noordwijkerhount, Holland, and H. J. M. Verschure, Cliostraat, 46[II], Amsterdam, Holland.

A patternplate oven for use with a shell-moulding machine, which entirely envelopes the patternplate during heating. The oven is provided with a bottom and a cover which may be separated from each other. The cover has at least one heating source and is adapted to be placed substantially on the bottom, which latter is detachably connectable to the shell-moulding machine. The patternplate is supported at a certain distance above the bottom.

Internal Defects in Steel Castings . . . .

. . . . their Nature and How They can be avoided

Internal defects on large forgings and castings form the subject of a paper contributed by J. M. Mowat, B.Sc., and P. Packham, B.Sc., both associated with William Beardmore & Company, Limited, Glasgow, to the recent symposium on "Internal Steel Quality and Methods of its Assessment" arranged by the West of Scotland Iron and Steel Institute. In a well illustrated paper the authors discuss defects that can arise during manufacture and ways of avoiding them, and make a plea for close consultation between designer and producer to avoid design features prone to defects. An abstract from the paper insofar as it affects founders is given below.

Internal defects in large steel forgings and castings that cause anxiety are those which exist just because large masses of metal of relatively large cross-section are being dealt with. This fact will be kept in mind while considering some examples and the possible cures.

General

Faulty steelmaking can produce troubles that will manifest themselves in inferior quality as measured by the normal routine methods of examination, and "dirty" steel, due to the separation of reaction products during tapping and teeming, is one result of deficiencies at this stage. The degree to which this can be tolerated depends on the product and its service requirements. As far as possible, every effort should be made, first to avoid the formation of these inclusions, and secondly to ensure if they do form that they rise into the ingot head where they will be removed in the discard. Indigenous non-metallic inclusions are most frequently very fine, but if they collect in a cluster they are readily detected by ultrasonic examination carried out at a later stage of production, and with experience in the use of this method of inspection their significance can be assessed and proper action taken. The natural solidification characteristics of all types of steel should be known and appreciated if the best approach is to be made to securing the most satisfactory product.

The demand for better-quality steel to give the properties now required is making it necessary that still more steel be made in the basic electric-arc furnace, and this steel has usually a higher initial hydrogen content than the steel from the acid open-hearth furnace.

Many restrictions and procedures are being adopted in steelmaking to prevent any unnecessary rise in the hydrogen content and numerous processes are being introduced to remove this undesirable factor while the steel is in the molten condition. After processing is completed a carefully calculated prolonged heat-treatment cycle is introduced to allow for hydrogen diffusion, and definitely controlled rates of heating and cooling are employed to keep to a minimum the complicated internal stresses introduced by heat-treatment all to prevent the generation of hairline cracks. These cracks are defects to be avoided and no high-duty component should ever be put into service where they are known to exist. However, seldom is it ever claimed that a failure has been directly attributed to hairline cracks, while it has been observed and even recorded, that jobs which had failed or had to be withdrawn from service for other reasons have been found to contain hairline cracks which in no way contributed to the failure nor reduced the life of the part.

Defects in Large Castings

Internal defects in large steel castings can be broadly divided into four types: those associated with contraction, sand inclusions, gas porosity, and shrinkage. Although internal contraction tearing unassociated with external hot-tearing has been reported, in practice this type of defect is extremely rare.

In general, hot-tearing is a major problem in the manufacture of large steel castings, but generally it should be classified as an external defect and is not here discussed.

Sand Inclusions

The problem of sand inclusions can be considered partly a technical and partly a practical matter; that is, the control and composition of the moulding materials used is very important and equally important is the technique of moulding used, including such aspects as the running method and mould reinforcement. Sand inclusions are more frequently met as defects on the top surface of castings and also on surfaces to which the sand can float but from which it cannot escape. Therefore, this type of defect could be considered as predominantly external, but undoubtedly it can often be met internally. By means of radiography these internal sand-pockets can be located and if considered advisable due to position or size, can be "dug out" and the cavity welded up.

Although it is important in every branch of foundry practice that the correct type of moulding sand be used, there is no instance where it is more important than with heavy steel castings. Due to the pressures and temperatures involved in casting, incorrect sand can have a disastrous effect on the

casting, leading to excessive rectification costs. Sand composition for heavy steel castings can be broadly divided into three types, namely, those based on "compo" or chamotte; synthetic silica-sand mixes; and those based on zircon sand. Broadly speaking, European foundries have adopted the "compo" or chamotte practice, and the US the synthetic silica-sand type. Zircon sand has been used with some amount of success on this class of work.

Two essential qualities required in the sand for heavy steelfoundry practice are freedom from erosion by the metal stream and freedom from spalling, both of which may lead to internal defects. The sand must have a sufficiently high dry-strength and/or hot-strength to withstand the metal stream. Strength properties, however, cannot be quoted, because widely different figures have been reported as satisfactory; so much depends on individual foundry practices, such as mould reinforcement, running methods, etc.

Compo or chamotte materials have good volume stability and are relatively immune from spalling. This cannot be said for synthetic silica-sand mixes as adopted in the US. In their practice to avoid excessive metal penetration considerable use is made of silica-flour additions, and the resulting mixes have a pronounced tendency to "scab." Extensive "nailing" is employed to prevent this, and the mould is poured at a very quick rate for the same reason. As long as the correct practice is adhered to for each type of sand, however, satisfactory heavy steel castings can be made from both compo and synthetic sand mixes. Although sand composition is important, the essential feature is to ensure that the correct moulding method and pouring technique is adopted for each moulding material to avoid such defects as sand from the mould being trapped within the casting.

Zircon is undoubtedly the best material yet developed for the manufacture of heavy steel castings as it combines the most desirable characteristics of synthetic sand mixes and compo-type materials without any major technical disadvantages. Its resistance to spalling is excellent and is on a par with compo, and its resistance to erosion is probably the best of the three main types. The maximum freedom from internal sand inclusions is to be expected from the use of this type of material.

The disadvantage with zircon sand mixes is price, but the extra cost of the sand must be balanced against its virtues.

Gas Porosity and Shrinkage

Gas porosity is used here to denote all types of porosity of a gaseous nature including entrapped air. When present as an internal defect it is often just below the surface, and rarely, if ever, at any real depth in a heavy section. Gas porosity should not normally be met as a serious defect if proper attention is given to the steelmaking and good foundry practice. The proper addition of aluminium to the ladle can do much to reduce this trouble. Precautions that must be taken in the foundry to counter the tendency to form these gas holes are among the fundamentals of good foundry practice. The mould and cores must be thoroughly dried, and preferably warmed up before casting, and it is essential to ensure thorough venting of all cores, preferably through vents allowing the easiest possible escape of gases. The usual running method with heavy steel castings is to run in initially at the bottom of the mould. This is likely to give the minimum of turbulence and prevent the trapping of gases. The top surface of the mould is usually fairly well vented automatically by feeder openings, but any surface at all remote from a feeder must be well vented to prevent defects due to entrapped gas.

Internal shrinkage is the most troublesome defect experienced by the steelfounder making large castings. Quite often designs are produced from which it is almost impossible to make a satisfactory casting.

It is unfair to expect the designer to know what is reasonable, because steelfounders themselves are far from unanimous on casting methods. Therefore a design produced for one foundry may not be the one most acceptable to another. The only satisfactory solution to this problem is maximum liaison between designer and foundryman. Furthermore, the designer should do his utmost to work to the suggestions of the foundryman.

Good working-arrangements have in the main been established between the designers of the firms using a large quantity of heavy steel castings and the founders catering for them, with definitely very beneficial results. The necessity for this liaison must be stressed, however, because with some designers its importance is not always fully appreciated.

Pakistan eases Import Restrictions

After eight years the Government of Pakistan has reintroduced Ordinary General Licensing for commercial goods imported into the country. Among the items now placed on OGL are steel and iron, including tractors and spare parts, spare parts of automotive vehicles, and tyres and tubes.

Under the new policy, parties interested in importing an item placed on OGL will be able to order without waiting for administrative approval. For the present, OGL will be allowed to resident nationals of the country—which means the exclusion of foreign concerns from benefits.

Passing on of "Know-How"

Suggestion that specialists in instrument technology should explain their skills to managements of smaller firms with no specialist department to deal with such matters, was made by Mr. P. M. K. Embling, director and general manager of the Power-Gas Corporation, Limited, to the Tees-side section of the Society of Instrument Technology. The UK engineering industry, he said, relied on the instrument makers. Much information came from the US, but, claimed Mr. Embling, recent events had shown that there might be something to learn from the USSR.

Peak ECSC Investment during 1960

Investment proposals lodged by industry in the European Coal and Steel Community last year amounted to US $1,954,000,000, compared with $1,800,000,000 in the three-year period 1957-59, states the High Authority of ECSC, which adds that this high level of investment is continuing into the current year. Of the 1960 sum, coal-mining development accounts for $146,000,000, iron-ore mining $6,000,000, and the iron and steel industry for the remainder. About $930,000,000 is connected with projects in the rolled-steel industry, and $520,000,000 on plans for flat steel. Steelworks investment accounts for a further $357,000,000, furnace coking plants for $41,000,000, Möller processing units for $132,000,000, and blast furnaces for $149,000,000.

Based on these investment projects are the estimated new production capacities for the Community's ferrous metals industry. Raw-steel capacity is expected to increase by 13,200,000 metric tons, and pig-iron capacity by 7,300,000 tons. Both the Thomas and the Siemens-Martin processes are expected to lose ground. Sinter capacity will increase by some 50 per cent. to 45,000,000 tons.

Birmingham Exchange enters Second Century

Centenary year of the Birmingham Exchange and Engineering Centre has a greater significance than mere longevity. The Exchange will in future be known as the Engineering and Building Centre, Birmingham, and before the year is out it will be installed in its new permanent exhibition hall at the former Masonic Temple in Broad Street, Birmingham.

Speaking at the annual general meeting of the Exchange on Thursday, March 9, Mr. A. G. Banks, president, described engineering and building as "separate, but inseparable, twins," and said that a building centre was long overdue in the Midlands. The new centre will have space for nearly 300 engineering and 300 building exhibits.

Last year 62,000 people visited the Exchange to see exhibitions staged by about 260 exhibitors and the information centre handled more inquiries concerned with production capacity than ever before. But the Exchange does not only wait for people to visit it: it takes an active part in organizing facilities at overseas trade exhibitions for its members, and last year the fairs at Leipzig, Poznan, and New York alone resulted in 600 inquiries from foreign buyers.

Twenty-five Years' Service Presentations

Last month, the directors of the National Steel Foundry (1914), Limited, gave a dinner party in Lundin Links Hotel for employees who have completed 25-years' service. As at December 31, 1960, 12 more employees qualified for the 25-years' badge, and at the dinner ten of these received their badge from Mr. C. H. Kain, chairman and managing director. The other two employees who were unable to be present owing to illness, were sent their badges together with a gift from the directors. Mr. P. B. Lake, commercial director, also made a short speech mentioning the strong ties which exist between the parent company, Lake & Elliott, Limited, in Braintree and the company in Leven. Mr. Arthur A. Marsh and Mr. G. Gordon Cargill were present to represent the local management. Mr. David McLean, sales manager, acknowledged the presentations on behalf of the recipients (Mr. D. McLean, Mr. W. Corstorphine, Mr. J. Wilson, Mr. R. McArthur, Mr. A. Duncan, Mr. W. Smith, Mr. W. Douglas, Mr. A. Wright, Mr. F. Love, Mr. A. Rotheram, Mr. G. Welsh, and Mr. J. Allison). In all, 114 badges have now been presented to those employees who have completed at least 25 years service with the Leven company.

Group photograph of the recipients of the 25-years' service badge of the National Steel Foundry (1914), Limited, at the dinner given in their honour by the company at the Lundin Links Hotel last month.

Notes from the Branches

Northampton Section

Mr. M. M. Hallett, chairman of the Technical Council of the Institute of British Foundrymen, was the speaker at Wellingborough Technical College on February 16 when the Northampton section held its monthly meeting. The lecture-room of the Technical College is now regularly used by this section for Wellingborough meetings which alternate with those held at the Plough Hotel, Northampton; in fact the College provides a very convenient Wellingborough meeting room, the only lack being some of the amenities of the Hind Hotel, where meetings were held previously.

The speaker's subject was "The Work of the Technical Council" and he explained that the investigations taken on by the various IBF sub-committees were very thorough and often lengthy. The real work of such committees was undertaken in members' own foundries and as such the whole organization depended on enthusiastic volunteers. Although the Institute did not possess any laboratories, some very enthusiastic studies into foundry problems were successfully completed.

Examples of Work Undertaken

Dealing with specific investigations, Mr. Hallett described in detail the work carried out in determining residual stress in castings, formed as a result of cooling contraction in castings of varying sections. This he pointed out gave very useful information about design which could be used to overcome or at least minimize residual stress. The alternative of heat-treatment for stress-relieving was dealt with, as were the difficulties and pitfalls therein.

The effect of a rigid mould on the strength of the casting was then explained and it was said that results showed quite conclusively that a hard-rammed mould produced a casting of greater strength than one made in a softer mould. Moreover, coarse sand produced a stronger casting as compared with fine sand and Mr. Hallett showed a number of slides bearing graphs to substantiate his remarks.

It became apparent as the lecture proceeded that the original terms of reference of a particular sub-committee when pursued to the limit often revealed other unanswered questions, such as the effect of gating on both the subjects previously mentioned. This was frequently the reason for further investigations many of which were inter-related one with another.

Section members were very interested in listening to an account of these investigations and the vote of thanks to Mr. Hallett, proposed by Mr. H. Edge, paid tribute also to all members engaged on this very helpful work throughout the Institute.

London

Approximately 100 members and guests attended the London branch meeting on February 22 at the Constitutional Club, Northumberland Avenue, London, W.C.2. Mr. H. Turner and Mr. P. Savage of International Combustion, Limited, had prepared the paper which was entitled "Production and Applications of Spheroidal-graphite Iron Castings in a General-engineering Firm," Mr. Turner actually putting it over to the audience, with his co-author assisting with the presentation of a large number of excellent lantern-slides. At the conclusion of the remarks on spheroidal-graphite cast iron, Mr. Turner continued by outlining the layout of International Combustion's foundry at Derby and giving particulars of some of the plant and processes operated—also illustrated by a further series of slides.

Discussion "Highlights"

The discussion which followed was so protracted that the president had to call "time" while there were still people wishing to speak and no doubt the proceedings were continued informally elsewhere after the closure of the meeting. Among points arising in discussion were:—That castings down to ¼-in. section could be satisfactorily produced in s.-g. iron; that the Fuess spectroscope which had been installed at the Derby works cost about £500 and had needed much preliminary standardization work before it proved itself (the Author's firm now used this for magnesium, chromium, and manganese estimations, but had not found it suitable for carbon, sulphur, phosphorus and silicon); chemical check analyses were still used on material outside normal specification ranges. The reason the spectroscope was relatively inexpensive was because it worked on the visible part of the spectrum, estimations being made by visual examination and not photographically or electronically. There was no need for desulphurization or tellurium pre-treatment of molten metal at the foundry, because only specially-selected steel scrap was used as raw material. Granulated carbon was used satisfactorily for carburizing the melt; machine-shop reactions to s.-g. were favourable particularly because of easy machinability (no more machining allowance was needed than for grey iron); the next step in expanding output would probably be to instal another mains-frequency melting unit of larger capacity—both physically and electrically. The firm's relative costs of s.-g. iron "at the spout" averaged at about 30 per cent. more than grey iron (taking the steel scrap at its market price). S.-g. iron required somewhat more provision for solidification shrinkage than grey iron but not so much as might be expected and nothing like as much as steel—some shrinkage could be countered by keeping the metal composition hypereutectic.

At the conclusion of the proceedings, a vote of thanks was proposed by Mr. B. Levy, saying that the Authors' discourse had indeed formed a complete and candid survey of the whole foundry operations at the lecturers' firm. Mr. J. Booth seconded and members applauded warmly.

Sheffield

At their meeting on March 6, the Sheffield branch heard a paper: "Manufacture of Malleable-iron Castings," given by Mr. W. J. Campbell, who is works manager William Lee & Sons, Dronfield. Mr. Campbell first described various types of malleable-iron castings ranging from whiteheart to blackheart and indicated that their properties depended upon the composition (including presence of trace elements), time and temperature of annealing and the composition of the furnace atmosphere. The metallurgy of malleable-iron production depended upon a critical balance being established between graphitizers and carbide-stabilizers. Recent research work into the use of bismuth and tellurium additions to produce "chill" in thicker sections and upon the value of minute traces of boron for increasing graphitization rates and nodule counts during annealing was reported. The speaker then described in detail the annealing cycle required to get maximum speed of annealing with the avoidance of temper-brittleness.

Pack annealing, he said, was now giving place to electric-furnace controlled-atmosphere annealing. With bell-type electric annealing-furnaces, it was possible to

accomplish annealing in between 70 and 90 hours as against 8 to 10 days by the pack annealing method.

Malleable iron afforded unique combinations of properties, such as extremely good machinability, castings free from residual stresses, good magnetic properties, strength approaching that of mild steel and extremely good impact strength at low temperatures. After machining, malleable castings showed a complete lack of distortion which was sometimes a great advantage.

The lecturer considered in detail methods of melting for malleable-iron production and indicated that the carbon content should be as high as possible, consistent with sufficient chilling propensities. Malleable iron he described as a dross-forming alloy and because of this care was needed in the running, gating and feeding of castings; some methods of avoiding dross in the final casting were outlined. Finally, the lecturer dealt with the practical aspects of patternmaking, moulding, stripping and cleaning of malleable-iron castings.

Discussion:

In the discussion, the following epitomises some of the replies to questioners: On castings weighing up to about 1 cwt., 55 to 60 per cent. yield on metal poured was customary; castings of a few pounds gave 40 per cent. yield, except with long runs, when as high as 50 per cent. could be achieved; cost of annealing tended to be about 75 per cent. of the total production cost (savings here could be obtained by reducing annealing time when using more-modern electric or gas-fired furnaces; with these units distortion troubles had been well nigh eliminated).

Discussing crystalline nuclei and their effect on graphitization, it was stated to be important to cool castings fairly quickly from 700 deg. C. to achieve a good nodule count. No satisfactory explanation could be given for the high impact-value and good ductility of malleable irons even when the phosphorus content was as high as 0.2 per cent. (malleable-iron impact values appeared to be better than steel with only half as much phosphorus). Pack-annealing, it was said, tended to "iron-out" effects of trace elements; controlled shorter-time annealing was more sensitive so that effects of minor elements became more obvious. If pressure-resistance only were required, cupola metal could be used directly but for optimum mechanical properties duplex melting was favoured, finishing with a rotary oil-fired or pulverized-fuel-fired furnace. Lining life of rotary furnaces should be in the region of 150-200 melts, taphole size ¾ to ⅞ in., metal should have a fairly high manganese:sulphur ratio and be poured at a fairly high velocity; ceramic strainer cores were said to be good but the lecturer had no practical experience here.

The vote of thanks was proposed by Dr. R. V. Riley, and Mr. W. J. Colton seconded, the proposition being carried by acclamation.

Newcastle-upon-Tyne

The annual dinner of the Newcastle branch was held at the County Hotel, Newcastle, on February 18, the branch president, Mr. J. C. Robinson, presiding. Members and ladies were received by Mr. and Mrs. Robinson and Mr. G. R. Shotton (president) and Mrs. Shotton. The two toasts of the evening were "The Newcastle-upon-Tyne Branch" proposed by Mr. Shotton and replied to by Mr. J. C. Robinson, and "The Ladies" proposed by Mr. E. Charlton and responded to by Mrs. Robinson. After dinner members and ladies were entertained by Cyril J. Futers and Heather & Chislette Ging. The branch secretary, Mr. S. Forster, who made arrangements for the event, is to be congratulated on organizing such a memorable evening.

Works Visit

Some 60 members of the branch visited the new roll foundry and roll machine-shop of Armstrong Whitworth (Metal Industries), Limited, Close Works, Gateshead-on-Tyne, on March 11. During the course of the tour the visitors were told by Mr. J. L. Smith, foundry manager, that the company had spent £500,000 on enlarging roll-production facilities, and now hoped to increase output to 15,000 tons a year.

The new foundry, where rolls of 50 tons can be cast, is 220-ft. long, 55-ft. wide and carries a 75-ton overhead travelling crane at a height of more than 40 ft. Melting equipment comprises four air furnaces with capacities ranging from 15 to 25 tons, and a three-ton electric furnace. The foundry was opened last month by Mr. Reginald Maudling, President of the Board of Trade. The plant installed in the new machine-shop is being augmented by a Herkules high-precision grinding machine being currently installed in another part of the works. The branch president, Mr. J. C. Robinson, is assistant foundry manager of the company.

Section Meetings: The North East Lancashire section of the Institute is holding a Foundry Apprentice Conference on March 29, details of which can be obtained from the secretary, Mr. R. K. Jackson, Myrtle Dale, 6, Allsprings Drive, Great Harwood, near Blackburn, Lancs. Two short papers by Mr. H. Edge and Mr. G. W. B. Hanna will be presented to a meeting of the Northampton section on March 30, commencing 7.30 p.m., at the Plough Hotel, Northampton.

Export-promotion Measures

Mr. F. J. Erroll, Minister of State Board of Trade, told members of the Dudley Chamber of Commerce at their luncheon meeting this month that the Government was working as hard as possible to avoid an "economic division" in Europe because of the European Common Market. Mr. Erroll was replying to the president of the Chamber, Mr. E. Bulley, who said he hoped that the Board of Trade would redouble its efforts to associate Britain with Europe "for our economic salvation." Mr. Bulley said plans of Imperial Chemical Industries, Limited, to spend £100,000,000 inside the Common Market to safeguard its position in Europe may have been a necessary step but it was an export of the worst kind, the export of capital.

Mr. Erroll said that while he could not say much about the ICI project, the Government realized the difficulties and dangers which lay ahead if it proved impossible to breach Europe's "two economic camps." One of the Government's major responsibilities was to work towards the reduction of international trade barriers and the greatest possible freedom of trade and payments without which world trade could not expand to the full. The Government intended to seek Parliamentary consent to spend £530,000 in the coming year on exhibiting British goods abroad in specialized fairs, national fairs, British trade shows and British weeks. In 1956-57 the sum spent on similar promotions had been £68,000 and in the current year was £333,000.

Mr. Erroll pointing out that no other nation provided the comprehensive service to promote exports that the Board of Trade offered, said that the Government had declined to contribute towards the cost of individual firms advertising abroad because it would be tantamount to a subsidy. Such a subsidy would result in competitors following suit and Britain would then be no better off.

Personal

Mr. D. C. M. SALT, director of sales since 1959, has been appointed a member of the board of Monsanto Chemicals, Limited.

Mr. R. A. WALPOLE has been appointed chairman of Chemical & Petroleum Investments, Limited, following the death of Sir THOMAS D. NICOL.

Mr. M. P. FOLEY has been appointed to the board of Crompton Parkinson (Chelmsford), Limited, a subsidiary of Crompton Parkinson, Limited.

Rear-Admiral J. H. UNWIN has joined the Furness Shipbuilding Company, Limited, as an executive director at the shipyard, Haverton Hill-on-Tees. Furness is a member of the Sears group.

Sir PETER ROBERTS, M.P., of Sheffield, has returned from a six-day visit to the Durgapur steel plant, India. He went for the Royal visit in his capacity as an official of the Indian Steel Construction Company which had built the plant.

To study American production techniques Mr. LAURENCE J. FORD, chief engineer of Stanley Works (G.B.), Limited, Sheffield, is making a tour of factories in New York, Boston, Detroit, Cleveland and other industrial centres. It is Mr. Ford's fifth visit to the United States.

Mr. T. H. SHAW, sales director, Thos. Firth & John Brown, Limited, is to fly to Moscow to be present at the opening of the British Trade Fair. Dr. G. LUCAS, in charge of the firm's roll sales, and Mr. J. A. CROFT, in charge of the export departments, will also be present at the Fair.

Mr. HAROLD E. PEARSALL, managing director of John Thompson (Triumph Stokers), Limited, fuel-equipment engineers, Leeds, has been entertained at a farewell dinner, attended by Mr. J. W. Perry, joint managing director of John Thompson (Wolverhampton), Limited, and other directors, on his retirement.

British Insulated Callender's Cables, Limited, announce that Mr. J. VARLEY and Mr. G. H. PARR, refinery manager and sales manager respectively of British Copper Refiners, Limited, of Prescot, have been appointed directors of that company. British Copper Refiners is a wholly-owned subsidiary company of BICC.

At a ceremony in Union Carbide's head office in London recently, Mr. HORACE CAWLEY, Sheffield area sales manager, Union Carbide, Limited, Alloys Division, was presented with an engraved gold watch in recognition of 25 years' service with the organization, by Mr. Ray Wilson, director and general manager of the Division.

Mr. G. A. H. JONES and Mr. S. J. L. HILL have been appointed directors of Powell Duffryn, Limited. Mr. Jones is managing director of Stephenson Clarke, Limited, and Mr. Hill is managing director of Cory Brothers & Company, Limited, both subsidiaries of Powell Duffryn. Dr. W. DAVIDSON has been appointed in charge of research and development for the heating division of Powell Duffryn.

Mr. C. VICKERS, director of the Vitreous Enamel Council, and vice-chairman of the Hardware Manufacturers' Association, has been appointed general sales manager of Ferro Enamels, Limited, Wombourn, Wolverhampton. In recent times, Mr. Vickers has pioneered the manufacture and promotion of enamelled aluminium in this country, having set up and operated the first plant built for this purpose.

Mr. EDWARD PARKINSON has retired from the joint managing directorship of J. Parkinson & Son (Shipley), Limited, machine-tools and vices, Canal Iron Works, Shipley, Yorkshire. At a ceremony to mark his retirement, Mr. R. Burnan, the longest-serving employee, presented him with a reproduction Sheraton cabinet and table lamps. The business was formed by Mr. Parkinson's grandfather a century ago.

Mr. ERIC W. YOUNG has been re-appointed chairman of Massey-Ferguson (United Kingdom), Limited. He relinquished the position in 1959 when Mr. A. A. THORNBROUGH, president of Massey-Ferguson, became temporary managing director of Massey-Ferguson (United Kingdom). Mr. Young is deputy chairman and managing director of Massey-Ferguson (Holdings), Limited. Mr. G. A. HUNT was appointed managing director of Massey-Ferguson (United Kingdom), last December.

Mr. John Boyd-Carpenter, Minister of Pensions and National Insurance, has appointed Mr. J. L. MCQUITTY and Mr. W. PAYNTER to be members of the Industrial Injuries Advisory Council. They will take the place of Mr. JOHN MEGAW and Mr. E. HALL, who recently resigned, the former on his appointment as a High Court Judge and the latter because of ill-health. Mr. Megaw had served on the Council since it was first constituted in 1947 and Mr. Hall had been a member since 1954.

Mr. IVON A. BAILEY has been elected a vice-president and Mr. JOHN O. HITCHCOCK an assistant vice-president of International Nickel Company of Canada, Limited, with effect from April 10. Mr. Bailey remains chairman and chief officer of International Nickel Company (Mond), Limited, and of Henry Wiggin & Company, Limited. Mr. Hitchcock remains managing director of International Nickel (Mond), and deputy chairman of Henry Wiggin. He will also continue as second chief officer of both companies.

First award of the Sir Walter Puckey Prize was made to Mr. L. C. LAMBERT at a meeting of the Wales region of the Institution of Production Engineers, on March 10. The presentation was made by Sir WALTER PUCKEY, past-president of the Institution, whose prize is an annual award open to first-year students taking Diploma in Technology courses in any branch of engineering in any college in England and Wales. It is made for an outstanding project in a production engineering subject.

Mr. PERCY A. ALLAWAY is to become managing director of EMI Electronics, Limited, in succession to Mr. CLIFFORD METCALFE, who is relinquishing the position, at his own request, on July 1. Mr. Allaway joined the Gramophone Company in 1930. In 1953 he was appointed general manager of EMI Engineering Development, Limited, and works director in 1956. He became deputy managing director of EMI Electronics in 1957. Mr. Metcalfe will remain a full-time director of Electric & Musical Industries, Limited. He became managing director of EMI Electronics in 1956.

Jones & Attwood, Limited, hydraulic engineers and ironfounders, Stourbridge, announce that owing to ill health, Mr. W. STRINGER-JONES has resigned his chairmanship and managing directorship of the company. Subsequent to the acquisition of the company by the Mining Engineering Company, Limited, manufacturers of conveyors and mining machinery, Worcester, Mr. BERNARD HIGGINS, joint managing director of that company also becomes chairman and managing director of Jones & Attwood. Mr. G. W. STANBURY, Mr. W. E. HAND and Mr. P. N. HOOD remain on the board of Jones & Attwood.

News from South Africa

South Africa's Second Graef Rotary Furnace Commences Production

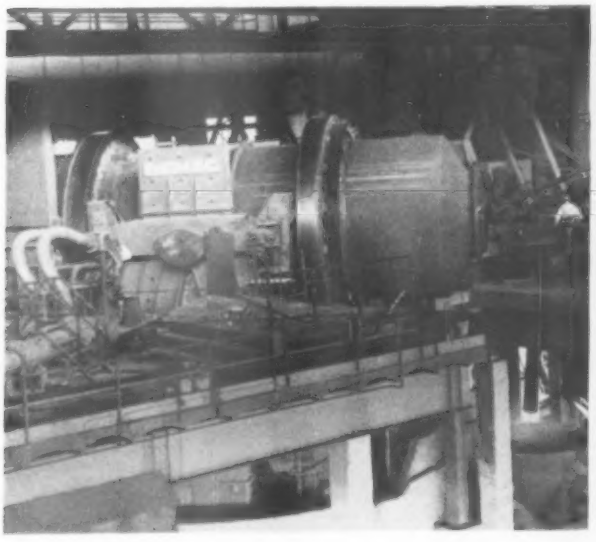
Iscor's second Graef "Rotor" plant (Figs. 1 and 2), which came into production at the Pretoria works last year, together with the one already in operation at the firm's Vanderbijl works, will increase the Corporation's steelmaking capacity by more than 500,000 ingot tons per year. The plant at Vanderbijlpark has been in production since November, 1959, and the "teething" troubles encountered during its early operation have provided valuable experience for the operation of the twin plant at Pretoria. The plants are the first full-scale commercial units outside Western Germany (this new steelmaking technique was developed at Hüttenwerk Oberhausen).

The system employed by the Graef "Rotor" furnace is pneumatic and was chosen as most suitable for Iscor's conditions after careful investigation lasting over a long period. It is claimed that the steel produced is at least as good as that made by the open-hearth method. Steelmaking proceeds in a rotary furnace 50 ft. long and 15 ft. dia., with a nominal capacity of 100 tons per melt, and the unit can tilt, slew and rock. Oxygen (95 per cent.) is injected into the bath by means of an adjustable water-cooled lance, and the carbon of the molten iron charged is oxidized to carbon monoxide (CO). In other pneumatic steelmaking processes the carbon monoxide thus formed leaves the reaction vessel and is finally burnt to carbon dioxide (CO_2) in atmosphere, valuable heat being lost as a result. In the Graef "Rotor" a portion of this heat loss is avoided by injecting a secondary stream of oxygen of lower purity over the surface of the bath, causing part of the CO to burn above and give heat to the bath. The temperature developed by the flame is very high, but because the "Rotor" turns slowly—between zero and 4 r.p.m.—the furnace lining, which consists of a basic refractory, is thus not exposed to maximum temperature for long. Control of the process is effected from an instrument house containing a large number of recorders and indicators for temperature, volume, pressure, etc.

Construction

The plants at Pretoria and Vanderbijlpark each consist of a base, supporting the cradle which holds the reaction cylinder, and which incorporates mechanisms for rotating, slewing and tilting. Actually two cylinders are provided; whilst one is in use the other is relined. Charging, blowing, slagging off, tapping and fettling can be carried out under varying conditions because the rotating vessel can be manipulated into any desired position. When relining is required, the cradle is slewed and the "Rotor" tilted vertically so that it rests on a special car adjacent to the base on which it is set for relining. The cradle then slews back by 180 deg. and picks up the second shell which has been relined whilst the first shell was in use. Each vessel, with its lining, weighs about 570 tons.

FIGS. 1 *and* 2.—*Views of the Graef "Rotor" steelmaking plant which was recently installed in Iscor's Pretoria works. Fig.* 1 *is a general view from the side of the rotary unit and Fig.* 2 *shows tapping in progress from one end, the "Rotor" being slewed and tilted for this operation.*



HEAD WRIGHTSON (TEESDALE), LIMITED, have placed an order with Pantak, Limited, of Vale Road, Windsor, Berks, for a 18 Mev Siemens Betatron, a mobile particle accelerator, which can be used for examining steel thicknesses of up to 16 in.

BROKEN HILL PROPRIETARY COMPANY, LIMITED, of Australia, is to build two bulk carriers for the Australian coastal trade. The ships, each of 21,000 tons, are to be built at Whyalla, South Australia, at a cost of over £A3,000,000 each.

Foundry Expansion in Scotland

A foundry which Allied Ironfounders, Limited, are erecting at Larbert, near Falkirk, at a cost of nearly £500,000, will be operated by a new company, Larbert Foundry, Limited. It will house plant of modern design for the manufacture of a variety of products for the building and engineering industries and for the home. Opening of the foundry is scheduled for the autumn of this year.

Mr. R. L. Hunter, managing director of the northern group of Allied Ironfounders based on Falkirk, comments: "This is an expansion move, and also a modernization that will offer greatly improved working conditions. It may provide opportunities of additional employment, as well as involving a short move for many of those already employed in our Falkirk factories."

The new premises, covering 18 acres, will incorporate, in addition to the foundry section, an enamelling shop for the finishing of cast-iron and sheet-steel components. Quantity production is already planned of domestic solid-fuel space-heaters, vitreous-enamelled fireplaces, domestic gas-cookers, and a wide range of builders' castings.

As a measure of rationalization, two companies in the northern group of Allied Ironfounders—Callendar Abbots & Dobbie Forbes, Limited, and the Forth & Clyde & Sunnyside Iron Companies, Limited—will cease to function. Mr. J. R. Walker and Mr. A. D. Brown, at present the respective managing directors of these two companies, are to become joint managing directors of Larbert Foundry, Limited. Operations of the two existing major companies in the northern group—Falkirk Iron Company, Limited, and M. Cockburn & Company, Limited—will continue uninterrupted.

February Steel Output

Production of steel during February was at an average rate of 485,300 tons a week, 1 per cent. higher than in February, 1960. The production of pig-iron, at 302,400 tons a week, was only slightly higher than in the same month last year. Output in February remained below the high rates achieved during the autumn of 1960. It was limited at some works by a weakening in the demand for steel sheet and also by a seasonal fall in requirements of tinplate. Nevertheless, the February production was consistent with an output of between 24,000,000 and 25,000,000 tons, the expected result for the year.

The annual review of capital expenditure in the iron and steel industry shows that expenditure during 1960 amounted to £146,000,000, nearly 50 per cent. greater than in 1959. A further substantial increase in expenditure is expected in 1961.

Latest pig-iron and steel output figures (in tons), with the corresponding 1959 and 1960 returns, are shown in the following table:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1960—December ..	306,000	15,912,000	451,100	29,459,000
1961—January ..	308,500	16,040,000	478,400	24,876,000
February ..	302,400	15,727,000	485,300	25,236,000
1959—December ..	280,400	14,583,000	432,900	22,513,000
1960—January ..	297,500	15,470,000	471,400	24,511,000
February ..	301,500	15,680,000	482,200	25,073,000

New Attitude Towards Exports

Mr. Reginald Maudling, President of the Board of Trade, was the chief speaker at the annual luncheon meeting in Birmingham on March 6 of the Midland branch of the National Union of Manufacturers. He said there were clear signs of a new attitude towards exports in British industry, and the number of enquiries coming into the Board of Trade was very encouraging.

Mr. Maudling prophesied that within 10 years India would be Britain's biggest market. Apart from exports, there must be a new attitude to industrial expansion he went on. "We must expand our national output more rapidly and more consistently. Unless we can do this we shall not succeed in meeting the export challenge." The key to the problem was the use of the labour force. As a country poor in raw materials, the only claim the UK had to the position it held in the world rested upon the skill and industry of British men and women. "To my mind no problem is more urgent than to increase the skill and adaptability of our labour force. This is true in every level of industry, management, staff and operatives alike," Mr. Maudling continued. "The Government is putting immense resources behind the drive for greater scientific and technical education but these resources will be wasted unless we have the co-operation of both sides of industry." In matters of salesmanship he felt Britain was behind its competitors. It was questionable whether salesmen were paid enough or given adequate status.

Col. E. R. Mayer, national president of the NUM, urged the importance to manufacturers of a strong home market. He said that all too often goods were prevented from entering a country through political interference and a strong home market was needed to maintain full employment.

Indian Foundrymen's Convention

The annual convention of the Institute of Indian Foundrymen is tentatively to be held during next month, at Bombay, under the auspices of the western regional branch, synchronizing with the annual general meeting of the Institute.

Papers contributed to this convention will be eligible for the following awards based on merit: (1) Institute of Foundrymen's Presidential Gold Medal for the best original contribution on any aspect of research pertaining to foundry technology; (2) A cash prize of Rs. 250 from Mr. T. R. Gupta, founder-president of the Institute of Indian Foundrymen and managing director (works) of Jay Engineering Works, Limited, for best contributions in the grey-iron casting technology; (3) Gold medal from Mr. N. G. Chakrabarti, works manager, foundry division of Telco, Limited, Jamshedpur, and (4) Binani Gold Medal from Mr. G. D. Binani, managing director, Binani Metal Works, for the best contribution in non-ferrous foundry technology.

Technical Education in Wales.—Welsh readers interested in education should procure a copy of "Technical Education in Wales," published by Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2; price 7s. The Central Advisory Council for Education (Wales), states that the support for industry for "sandwich" and other advanced courses offered has been very disappointing. The Council calls for the establishment of a national craft apprenticeship system which would free individual industries from the responsibility of providing craft training. (This cuts right across existing precepts.)

Equipment & Supplies

Prefabricated Offices

The installation of new plant and the re-arrangement of existing plant presented Refined Iron (Darwen), Limited, with a further expansion problem—that of providing new office-accommodation. The necessity to build a new office block was apparent, but it had to be ready for occupation within a few months. It was decided that the new building should be the head office serving the administrative needs of the group of companies. The firm's architect was then faced with the problem of integration of directors offices, boardroom, sales, accounts, staff-canteen, stores and weighbridge office, whilst bearing in mind the possibility of future expansion. Taking into consideration time, cost and design factors, he suggested prefabrication as a solution. Finally the new "type 6" system of construction manufactured by Vic Hallam, Limited, of Langley Mill, Nottingham, was chosen, which embodied a factory-made components system.

It is claimed that this is a permanent system of construction offering planning flexibility at low cost, fast erection, and little time spent during its design stages. Construction is based on a horizontal module of 76 ft. consisting of a 4-in. structural thickness with 72-in. infill panels. Two roof systems—flat or pitched—and a wide range of ceiling heights are available. The building for the Refined Iron Company (Fig. 1) took only three weeks to erect on prepared foundations and was ready for occupation within six weeks, the construction included fibre-glass insulation to walls and ceiling.

Mortiser

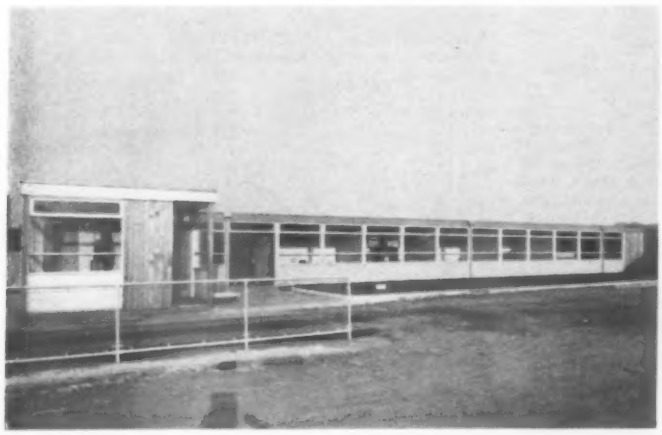
Thomas Robinson & Son, Limited, Railway Works, Rochdale, have recently announced a new type of interchangeable chain-and-chisel mortiser. The machine, known as the ZH/E, embodies two new features which hitherto have not been offered with this class of machine These are a double depth-stop arrangement which permits both mortise and haunch to be gauged positively at one set up, and an (optional) spacing and line indicating apparatus. It is claimed that these new features allow greater flexibility in set-ups for repetitive mortising, and provide for faster and more accurate production.

A simple method of fitting is provided for both the chain and chisel headstocks, and the machine can be changed over from chain to chisel cutting, or *vice versa*, in about two minutes. The mortiser will take chains to cut mortises up to 1¼-in. wide by 5½-in. deep, and chisels up to 1-in. square. When chain mortising, the chain is driven directly by a sprocket mounted on the motor spindle, and when chisel mortising the ball-bearing-mounted chisel-headstock spindle is driven through silent-running spiral bevel gears. The four h.p. motor fitted is suitable for two or three phase a.c. supplies, and is mounted on sealed-for-life ball-bearings. An automatic cut-out for the motor is provided.

Flooring Composition: Most foundries have in certain locations such as laboratories or pickling shops "difficult" floor areas which create perpetual maintenance problems, because heavy traffic and spilled corrosive materials often necessitate frequent re-surfacing. A new floor-topping material, consisting of resins and aggregate, known as "Epiflor," has been developed by Tretol, Limited, The Hyde, London, N.W.9, for such locations. It is claimed to be a strongly adherent and non-slip topping (applied ¼-in. thick) resistant to chemicals, oils and acids, having good abrasion resistance, and that it can be laid by firm's own staff.

Export Exhibition Centre: A 57,000 sq. ft. island site bounding Leicester Square, London, is to be developed as an exhibition centre for Britain's exporters. The promotion is a joint effort by Ideas Marketing Pool, Piccadilly Centre, Digby Smith International Travel and Icelandic Airlines. Three floors will be devoted to a mixed-trades permanent exhibition where the sale of export goods will be permitted to the public as well as wholesale order-taking from overseas buyers who will be ferried in at special rates by Icelandic Airlines. Another three floors will be devoted to weekly and fortnightly trade-shows for wholesale buyers only. Exhibitors' and buyers lounges and bars will be provided.

FIG. 1.—*Exterior view and (right) a section of the general-office section of new staff accommodation erected from prefabricated units for Refined Iron (Darwen), Limited.*



Law Cases

Foundry not to Blame

An award of £2,250 damages made by a jury last June to a Glasgow foundry employee who lost the sight of an eye in an accident was set aside on February 23 by the First Division of the Court of Session. Mr. Robert Marshall had sued his employers, Babcock & Wilcox, Limited, boilermakers, Renfrew, for £3,000, claiming that the sight of his right eye was destroyed when molten metal which he was pouring into a moulding bed spurted up from the hand ladle, striking him in the face.

Marshall blamed his employers for the accident on the grounds that: (1) they had not supplied him with a proper eyeshield; (2) alternatively, they should have provided him with a crane ladle or shank ladle to keep him out of reach of spurting metal; and (3) they had breached a statutory regulation which demanded that suitable goggles or other eye protection should be provided. A jury sitting with Lord Guest found for Marshall and awarded him £2,250.

The Division held, on February 23, that as, admittedly, Marshall had been supplied with goggles and had pushed these up to his forehead just before the accident occurred, his employers had complied with their duty in this regard. It was true there was evidence that the goggles tended to become steamed up, but the jury had not been entitled to infer negligence in the supply of goggles when there was no evidence as to the existence of any type of goggles in which misting up could be avoided. That ground of fault therefore failed.

Since the second ground was alternative to the first, it did not arise. The third also failed since, in compliance with the regulation, suitable goggles had been provided. The fact that they might steam up was not sufficient to make them unsuitable for use. Lords Carmont and Guthrie concurred, and, as there was no ground for allowing a new trial, the court entered their own verdict for the defenders.

Press-guard Missing—Firm Fined £150

A Falkirk firm of brassfounders were fined £150 at Falkirk Sheriff Court when they pleaded guilty to having, on October 17, 1960, failed to keep in position fencing provided for the top and bottom tools of a power press, whereby Christina Thomson, an employee, was injured. For HM Inspector of Factories it was stated that the press was being used to turn out brass components. Another woman was pushing the brass strips into the machine which Thomson was operating. A brass strip became jammed. When the operator leaned over to push the strip clear, the top tool of the press came down on the small finger of her left hand. The finger had to be amputated at the knuckle. A guard for the machine was lying on the floor.

An agent for the company said that the power press was normally used for smaller components which were inserted at the front of the machine, and when this was being done the guard was put up. On this occasion, however, it was a somewhat unusual job and the brass strip was being inserted from the side and the guard was not put up. The firm were extremely careful about safety matters and there were strict instructions that the machines should not be used without a guard.

Conveyor defined as a "Machine"

In an action for personal damages against Stanton Ironworks, Limited, at Nottinghamshire Assizes, Mr. Alfred Henshaw, aged 45, coremaker, was awarded £156 7s. 9d. It was stated that in June 1958, Henshaw and another man were making cores for pipe moulds. Henshaw slipped as he was pushing a heavy plate on a gravity conveyor, and his left hand was trapped between the plate and the rollers.

Mr. A. W. M. Davies, for the firm, said that his case was that the conveyor was not a machine within the meaning of the Factories Act. He submitted that it was incredible that Henshaw trapped his hand if he were doing his job properly. If the firm were in breach of statutory duty, then so was Henshaw, said Mr. Davies.

Mr. Justice Phillimore, giving judgment for Henshaw, said, "I have not the slightest doubt that this conveyor was a machine, although it is not easy to define exactly what a machine is." He added that Henshaw was not guilty of any contributory negligence.

British Standards Institution

To meet the needs of industry in the rapidly-growing field of investment castings, the British Standards Institution has prepared B.S. 3146: Investment castings in metal and Part 2 which has now been published deals with high-alloy steels, nickel and cobalt alloys. The standard specifies only those castings made by a process which involves the investment of an expendable panel by refractory slurry and does not include those made by shell-moulding.

Section one covers the general requirements and specifies the process of manufacture, the method of identification of the casting, the procedure for testing both mechanically and by known destructive methods and the arrangement necessary for repairing castings. Section two covers specific requirements of 18 different types of castings, many of which are sub-divided into two or three grades. The chemical composition of each type of casting is specified in detail, together with the mechanical properties which are required. Copies of the Standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 8s. 6d.

Indian Foundries Record Production

Soon after the all-time record of highest production yields of the Kulti foundries of the Indian Iron & Steel Company, Limited, in Bengal, achieved during November, 1960, the group foundries touched a yet-greater height in production totals for December, 1960, with a gross tonnage of 21,076 as compared with the November figure of 20,029 tons. Details of the production during December are given below.

Department	*Production in tons (long)*
No. 1 Pipe Foundry	1,805
General-castings Shop	2,823
Light Castings	1,226
Heavy Mechanized Foundry ...	190
Spun Pipe Plant No. 1	5,419
Spun Pipe Plant No. 2	9,364
Steel Foundry	202
Total	21,029
Non-ferrous Castings	47

RICHARD BAXENDALE & SON, LIMITED, ironfounders and heating-appliance makers, have moved their offices to their new works at Bamber Bridge, Preston. The production department will move to Bamber Bridge later.

NSMP Notes

About a dozen members of the National Society of Master Patternmakers under the presidency of Mr. E. C. Rowen—and including a number of past-presidents and Council members—were joined by guests from amongst Scottish master patternmakers at dinner in More's Hotel, Glasgow, on Wednesday of last week. The local representatives had been invited with a view to acquainting them with the benefits accruing from membership and the quite good turnout indicated the interest which has arisen in Scotland in the activities and aims of the Society. At the end of the meeting, at which Mr. Rowen, Mr. J. Vickers and Mr. W. D. Hartley and Mr. R. Mouseley, among others, spoke about the activities of the Society, the visitors showed by their comments and discussion that they were much impressed by the solid achievement which the Society had already made during its relatively short existence.

At a Council meeting preceding the dinner, the agenda included discussion of certificates of membership, revision of patternmakers' contraction rules, works visits in the Hull area, arrangements for the dinner/dance and the return visit of the Italian master patternmakers (see below). Suggestions were made for positive means of promoting greater efficiency in master patternshops and an announcement was made regarding the Society's official visits to the Engineering, Marine, Welding and Nuclear Energy Exhibition on April 26.

Visit of Italian Patternmakers

Provisional arrangements for the reception of the Italian Master Patternmakers (expected to number between 10 and 20) are as follow: They will arrive in London on May 29 and be met by members of the Society and stay in London hotels. On the following day, they will travel to Leicestershire, visiting works in that area and returning by coach to London. On Wednesday, they will visit the National Science Museum, Kensington, lunching with members prior to further works visits in the London area. On Thursday, they will travel to Birmingham in the morning and inspect further patternmaking establishments in that area. On Friday there will be a trip to the Ford Motor Company, Limited, together with members of the Society (as mentioned below), and on the Saturday, after sightseeing during the day they will join in the annual dinner/dance of the NSMP at the Waldorf Hotel. During the whole of the week a complementary programme has been arranged for the ladies, including visits to Kew, fashion shows and Stratford-upon-Avon.

Visit to Ford Motor Company

The visit arranged to the Thames foundry and patternshops of the Ford Motor Company, Limited, for the Italian visitors on Friday, June 2, will also be open to all members of the NSMP. The times for the trip to Dagenham by boat will be as follow: Depart Charing Cross Pier, 11 a.m.; luncheon on board and arrive at Dagenham at 1 p.m. Depart from Dagenham 3.45 p.m. and arrive at Charing Cross Pier, 5.30 p.m. It is essential that reservations be made as soon as possible, and members wishing to participate are asked to complete reply forms and return them to the secretaries, Fisher & Firkins, 12, Cherry Street, Birmingham 2, not later than April 5. Cost of boat fare, luncheon and tea is 37s. 6d. per head.

Annual Dinner/dance

As mentioned above the Society is holding its annual dinner/dance this year at the Waldorf Hotel, London, on Saturday, June 3. As it has not been possible for arrangements to be made on the same basis as in previous years, the Society advises members to make their own arrangements for accommodation without delay. Tickets for guests and members may be obtained from the secretaries, Fisher & Firkins, address as previously quoted. The annual general meeting will be held in the afternoon of June 3.

Paris Motor Show Visit

The Society is considering organizing a visit to the Paris Motor Show in October. The show is to be held from October 5 to 15, and if participants travelled on the evening of Friday, October 6, returning on Monday, October 9, it is understood the cost would be approximately £15 with cheap night flights, or £23 at day-flight rates. These costs would include three nights at an hotel. Those interested should write to the secretaries—Fisher & Firkins.

Relics may help Corrosion Research

A 12-ton cache of Roman nails discovered last year near Spittalfield, Perthshire, may help iron and steel manufacturers to solve the problems of corrosion. They are to be classified and analysed at the central research station of Colvilles, Limited, at Motherwell, to discover if possible the secret of their excellent condition in spite of burial for hundreds of years. A spokesman for the Iron & Steel Institute, who are handling the investigation, said what they wanted to find out about the nails was the method of construction, and what has prevented corrosion.

From examination of the heads of some of the larger nails it is obvious that a four-part die was used. This form of construction was previously thought to have originated much later than the Roman occupation. Many other bodies will be co-operating in the examination, including the British Iron & Steel Research Association, Imperial Chemical Industries, Limited, the Ministry of Works, and the National Chemistry Laboratory.

Social Effects of Automation

First British conference to consider the purely social and economic effects of automation, which will be held in Harrogate from June 27-30, will be opened by Viscount Hailsham, Minister of Science. Sponsored by a committee of eight of the member organizations of the British Conference on Automation and Computation, it will have as its title "Automation—Men and Money."

Among speakers who will consider the social aspect in the wider context of automation will be Mr. W. J. Carron, president of the Amalgamated Engineering Union, and Mr. E. F. Schumacher, economic adviser, National Coal Board. Mr. A. L. Stuchbery, chief technical engineer, Metal Box Company, Limited, will be among speakers covering the social implications within firms.

Mr. JOHN BLACK, deputy chairman of Metal Industries, Limited, has been appointed, in addition, managing director of the company, and Mr. WILFRED PADLEY becomes deputy managing director. Mr. Black joined the company as chief accountant in 1951 and was appointed to the board in the following year. He became deputy chairman in 1956. Mr. Padley joined the group in 1956 and was managing director of Brookhirst Igranic, Limited, a subsidiary, before being appointed to the parent board in 1960.

News in Brief

LAST MONTH the first consignment of pig-iron from Consolidated Mining & Smelting Company's new plant at Kimberley reached Vancouver, British Columbia, for the Mainland Foundry.

ORDERS FOR CRANES worth approximately £1,000,000 placed with the Glasgow firm of Butters Bros. & Company, Limited, include a Canadian contract (£200,000) and a Polish one (£100,000). Orders valued at £500,000 have been received from British shipyards.

A REPEAT ORDER has just been placed with Scammell Lorries, Limited, of Watford, by the General Geophysical Company, of Houston, Texas, for two 4 by 4 Mountaineer 1,500 gall. water tankers and a stake-sided Mountaineer truck with winching equipment.

R. W. CRABTREE & SONS, LIMITED, the Leeds printing-machine and machine-tool organization, have secured Canadian and United States orders worth more than $3,000,000—about £1,000,000—following a recent tour of North America by the chairman of the Leeds company, Mr. Charles Crabtree.

BRITISH STANDARDS INSITUTION announce that the seventh annual conference of engineers and others concerned with the application of standards will be held this year on May 9 and 10 and will be opened by the Rt. Hon. Viscount Hailsham, Lord President of the Council and Minister for Science.

SHEFFIELD UNIVERSITY has received grants totalling £25,000 from the Department of Scientific and Industrial Research for the purchase of equipment. The department of physics receives £15,000 over two years for the purchase of an electron microscope for magnetic research. The department of bio-chemistry receives £9,400 for the purchase of an electric-centrifuge.

A CONTRACT for making components, comprising initially 25,000 parts, for the Swedish Volvo car has been secured by Arthur Thomson & Company, engineers, Whitemyre, Fife. The company has also been asked to quote for five other components of the car involving 40,000 parts. The bodies of the cars are made in Paisley by the Pressed Steel Company, Limited, at Linwood.

PETROL, PARAFFIN AND OIL helped to add to the flames when a fire broke out during the morning of March 15 in the premises of Arthur Green, Limited, ironfounders, Old Whittington, Chesterfield. A fitting shop was involved and sustained considerable damage to its roof while tools and other equipment were damaged or destroyed. It is understood that the fire has not affected production.

CRAVEN BROTHERS (MANCHESTER), LIMITED, machine-too' makers, Stockport, have received orders valued at more than £600,000, bringing intake of new work since the beginning of the year to more than £1,000,000. Further substantial contracts are being negotiated. Most of the orders are for export, and include contracts for India, Australia, South Africa, Brazil, France, Spain and Greece.

THE UNION STEAM SHIP COMPANY has placed a firm order in Dundee for two new Tasman freighters at a cost of over £1,250,000 according to company chairman and managing director Mr. H. Dobie. Tenders for the motorships have been called in Britain, Australia, and Hong Kong, and the company has accepted that of the Caledon Shipbuilding and Engineering Company, Dundee, from the 17 received.

THE OPENING CEREMONY of the rebuilt London Metal Exchange has been postponed from April 23 to April 28 to enable the Lord Mayor of London, who is on a visit to Amsterdam, to perform the ceremony. The arrangements for the dinner to be given by the London Metal Exchange at the Savoy Hotel on April 25, remain unchanged. The Rt. Hon. Iain Macleod, M.P., Secretary of State for the Colonies, will be guest of honour at the dinner.

C. A. PARSONS & COMPANY, LIMITED, Newcastle, have secured an order worth £13,000,000, for the supply of four 500,000 kw. single-line turbo generators for the Central Electricity Board. The new order brings the number of generators of 500,000 kw. capacity and over to be constructed by the company for service in this country and overseas to six. One of these is being built for the Tennessee Valley Authority for installation in the Colbert steam plant in the United States.

THE 1960 GEORGE BRAY MEMORIAL LECTURE—"The Protective Treatment of Metals Against Corrosion," by H. Silman, B.SC., F.I.M.—is to be presented to the Institution of Production Engineers in the Pillar Hall, Olympia, London, on Wednesday, April 26, at 4.15 p.m., the day of the Institution's official visit to the Engineering, Marine, Welding and Nuclear Energy Exhibition. Admission is by ticket only, which may be obtained from the secretary of the Institution, 10, Chesterfield Street, Mayfair, London, W.1.

UNITED STEEL COMPANIES, LIMITED, Sheffield, held their twenty-second annual conference of works councils at Harrogate over the weekend of March 11, under the chairmanship of Mr. J. E. Pickles, chairman of the works council of Steel Peech and Tozer. The conference opened with an address by Sir Walter Benton Jones, Bt., chairman of the company, and subjects discussed included safety in works, pensions and sick benefit schemes, the company's trading prospects, financial results for the past year, and long-service awards.

SHEFFIELD PRODUCTS on their way to the British Trade Fair to be held in Moscow in the summer, include two 30-ton forged-steel back-up rolls from Thos. Firth & John Brown, Limited; there is also a 4½-ton work roll ground to a mirror finish. The rolls are travelling by sea but after the Fair will return overland to Belgium. There they will be part of a new four-high, five-stand strip mill. A six-yard all-cast dipper bucket has been sent from Hadfields, Limited. Early despatch of these heavy items has been made to enable handling facilities to cope with them.

DAVY & UNITED ENGINEERING COMPANY, LIMITED, Sheffield, has received an order valued at about £1,000,000 for the design, supply and installation of oxygen-blown Kaldo furnace plant at Etruria Works, Stoke-on-Trent, of Shelton Iron and Steel, Limited. This project, it is reported, will be the first complete steel-melting shop in the UK to utilize only Kaldo furnaces and the Sheffield firm is responsible for the overall engineering. A substantial portion of the contract will be manufactured at the Stockton works of the Davy-Ashmore group, of which the Sheffield firm is a member.

TO HELP SHEFFIELD BUSINESSMEN who have to meet representatives of overseas firms visiting the city, Sheffield College of Commerce and Technology holds classes at varying levels in a number of languages, states the annual report on the work of the department of commerce and management. The languages include Spanish, Italian, Dutch, Russian and Swedish. Sheffield is one of the few colleges in the country to hold classes in Chinese, and the report says that in view of the rapidly growing amount of technical and scientific

literature available in this language the provision of the classes is important.

NEWTON HOUSE, a branch of Newton Chambers & Company, Limited, Union Street, Sheffield, is to disappear after 67 years on account of redevelopment and road widening. The frame of the building is of cast iron and was made at the company's works at Thorncliffe and transported to Sheffield. After it was erected in Union Street the rest of the building was constructed round the frame. It is expected that Newton House will close in two or three months. Alternative employment will be found for the staff. It will break a direct trading link with Sheffield that has existed for 90 years.

ALBION MOTORS, LIMITED, Glasgow, have received an order valued at more than £60,000 from the Netherlands for 24 six-wheeled Reiver haulage chassis. Sales of Albion vehicles to the Netherlands, against strong competition, have increased by 32 per cent. during the past year. Orders from African buyers include a £20,000 fleet of Albion Clydesdale tanker chassis for the Standard Vacuum Oil Company (East Africa), Limited, and six Reiver tipper chassis and four Clydesdale haulage chassis for the Durban Corporation. East African Breweries, Limited, have ordered a further three Albion Reiver chassis.

THE RAVENGLASS AND ESKDALE LIGHT RAILWAY—"La'al Ratty"—recently bought by auction for £12,000 by a syndicate of enthusiasts formed into a Preservation Society, will run for four days at Easter. It will afterwards open for the summer season on May 13. Money to carry the railway through the winter, and pay for the staff of eight and maintenance work was put up by Mr. Colin Gilbert, a Birmingham stockbroker, and Sir Wavell Wakefield. The Ravenglass and Eskdale Railway Preservation Society now has 230 life members who have paid £20 each, and about 800 members who pay £1 each. Mr. D. Fereira has been appointed general manager.

SCOTTISH AVIATION, LIMITED, Prestwick, Ayrshire, have gained contracts worth millions of pounds for new aircraft and repair and maintenance work for Service and private customers. About 300 new jobs will become available this year and stability of employment will be assured for the present labour force of 1,800. The contracts include an order for 10 Series 3 Twin Pioneers by the Government of the Federation of Malaya; the taking over of Merlin and Griffon piston-engine work in large measure from Rolls-Royce, Limited; repair and maintenance of Royal Canadian Air Force jet aircraft, and repair and overhaul of Pratt & Whitney 1830-type engines.

FURTHER EXTENSIONS are proposed to the small iron and brass foundry of T. Gibson & Son (Stamford), Limited, in Broad Street, Stamford (Lincs). At the foundry practically all the work is done by hand, but more machinery is to be installed when the foundry is extended. Seven of the eight employees working there became shareholders last year on the death of Mr. Dudley Henson who had carried on the business for many years. He left the business to his old employees and in October last the present limited company was formed. Directors of the company are Mr. J. W. Short, who joined the firm 31 years ago, Mr. E. Tyers, who has been there for 20 years, and Mr. F. Locke with 35 years' service.

A WEEK'S COURSE on heat-transfer was opened at Sheffield University on March 19 by the vice-chancellor, Dr. J. M. Whittaker. About 140 technologists from industry, universities and Government departments are attending, covering 42 companies, eight universities and colleges, six government departments and five research institutes. Most of the lecturing staff is from the department of fuel technology and chemical engineering of Sheffield University, but lectures are also on the programme by Professor D. B. Spalding, of the Imperial College of Science and Technology, London; Professor G. Burnay, Professor of Mechanics and Applied Physics at Liège University, and Mr. G. Wellensiek, of Düsseldorf. Professor M. W. Thring is director of studies.

AT THE ANNUAL LUNCHEON of the Birmingham branch of the British Institute of Management in Birmingham, Sir Josiah Eccles, deputy chairman of the Electricity Council, urged that all resources of technology and science be used to enable this country to keep ahead of innovation and compete abroad. The securing of a share of world markets must be treated as being as important to the country's livelihood as the home market. Sir Josiah said he saw no future in restricting imports as a way of solving balance of payments problems. Since Britain's exports were mainly manufactured goods, it would invite retaliation if the entry to the U.K. of foreign manufactured goods were prohibited. Furthermore a good market for raw materials helped the primary producing countries to buy more of the kind of things we wished to sell.

Obituary

The death has occurred at the age of 60 of Mr. HERBERT HEAD, works superintendent of Tilghmans, Limited, Broadheath, Altrincham.

A former director of Marple & Gillott, Limited, Stevenson Road, Sheffield, Mr. J. W. Turner, has died aged 68. He had served with the firm for over 50 years.

Mr. ALEC RIDDELL, formerly shop superintendent of the Rolls-Royce power-plant, at Ilkeston, has died at the age of 71. He was one of the pioneers of Rolls-Royce, Limited, who moved to Derby with Sir Henry Royce from Manchester, 48 years ago.

Mr. MATTHEW B. BAIRD, a retired director of A. Baird & Son, Limited, ironfounders' engineers, Hamilton, has died aged 78. He served his engineering apprenticeship with the firm, of which his father and grandfather were directors. He was a director of the firm for about 50 years.

Mr. RONALD MCDONALD PATERSON, a director of A. R. Brown, Macfarlane & Company, Limited, iron, steel and metal merchants of Glasgow, has died aged 62. He had served as president of the Scottish Scrap Iron, Steel and Metal Association and also as National Federation president.

The death is announced of Mr. JAMES HARRY HALL, 79-year-old former director and chairman of Hall & Kay, Limited, the Ashton-under-Lyne air-conditioning engineers. He was a son of the late Alderman Daniel Hall, who helped to found the firm in 1878. When he retired 10 years ago Mr. Hall had been a director for 55 years.

Mr. JAMES CORLETT, formerly assistant secretary with Richmonds Gas Stove Company, Limited, of Warrington, died on March 3 at the age of 77. He started work as a part-timer at the age of 13 with Fletcher Russell & Company, Limited, eventually becoming secretary, and when the company was amalgamated with Richmonds he became assistant secretary. He retired in June, 1959.

Book Reviews

Embrittlement by Liquid Metals, by W. Rostoker, J. M. McCaughey, and H. Markus. Published by Reinhold Publishing Corporation and obtainable from Chapman & Hall, 37, Essex Street, London, W.C.2; price 65s. post free.

The preface to this book describes the field as unfamiliar to most. Not only is this statement true, but the courage required to publish a book on such a restricted subject deserves praise. The preface refers to some possible advantageous applications of liquid metals which inevitably would involve the problems outlined if they were followed up. As a scientific monograph, the book may therefore be ahead of its time.

The contents are divided into seven sections covering a literature review; occurrence of embrittlement; crack propogation; factors influencing this type of embrittlement; delayed failure; theory of fracture, and mechanism of embrittlement. The review chapter contains a chronological list of publications commencing with stress cracking of brass by mercury, through lead, tin and zinc embrittlement of steels and aluminium alloys, to modern work on the interfaces between liquid and solid. The two chapters on occurrence and factors enlarge upon the published literature in a competent and lucid manner. "Delayed failure" deals mainly with fatigue and internal friction results and is understandably very short. The section on theory of fracture deals with the general problem and is an ideal condensation of the subject on which much has been written in the past few years. From a teaching point of view, or that of a reader who is not familiar with this subject and wishes to learn more, this chapter is highly recommended.

The last section on mechanism of embrittlement by liquid metals continues the review of fracture theory into this specialized field and, again, is concise and informative. Indeed the book is to be recommended for the last two sections alone which together form almost half the text.

The book is expensive for its size, as one can expect from a specialist subject and an American publisher. It is suitable for the scientist, not the practical man, although the latter might well profit by reading it. Mathematics are kept to a minimum. The text is very clearly printed, and diagrams and photographs are well produced.

C. R. TOTTLE.

Steel Castings Handbook (Third Edition), edited by C. W. Briggs. Published by the Steel Founders' Society of America, Terminal Tower, Cleveland, Ohio, USA; price $5.50, plus postage (also obtainable from the Penton Publishing Company, Limited, 2, Caxton Street, London, S.W.1; price £2 15s., plus 2s. postage).

The Steel Founders' Society of America, to mark the 100th anniversary of the steel castings industry in the USA, have produced this third and much enlarged edition of the Handbook, edited by Mr. C. W. Briggs, who is technical and research director of the Society. The book, which comprises no fewer than 670 pages and 679 illustrations, undoubtedly constitutes the largest collection of information about steel castings ever published in a single volume and will be of great value both to steelfounders and to users of steel castings.

The major part of the text is directed at the latter category of reader and altogether 540 pages are devoted to a consideration of the applications of steel castings, the advantages that they offer to the engineering designer, the design of castings and the properties of cast steel. The chapter dealing with applications is profusely illustrated with 150 photographs of steel castings, for a great diversity of uses, and is introduced by a well-written chapter illustrating the design advantages that steel castings often offer in comparison with fabrications or forgings. Some very useful guidance is given to customers in a chapter on "The Purchasing of Steel Castings" and the subject of casting design is comprehensively described. The following chapters deal with patterns and casting tolerances and a most useful summary is given of the normal variations that are encountered in properties of steel castings. In fact, the ensuing ten chapters constitute a uniquely comprehensive collection of data on properties. They incorporate all that is known at the present time on physical constants, tensile, impact, fatigue properties, and hardenability of plain-carbon and low-alloy cast steels. Wear resistance, low-temperature and high-temperature properties, corrosion resistance, welding, heat-treatment and machinability are all dealt with in separate chapters.

The remainder of the book surveys briefly the manufacture of steel castings—melting, moulding and coremaking, finishing, heat-treatment, inspection and testing. This section is not intended to be a textbook on foundry practice, but is obviously written as general background-information for the user of steel castings. As such, it is entirely adequate. The final chapter reviews the history of the steelfoundry industry in the USA and predicts its future trends. There is a useful glossary of terms and definitions and an adequate subject index. In relation to its size and quality of production, and in comparison with prices at which American texts are normally sold in this country, the price is extremely reasonable.

In the reviewer's opinion no library either in a steel foundry or in an engineering company that uses steel castings can afford to be without this book and its proper place is in the personal bookcase of all who are regularly concerned with the use of steel castings.

A. H. SULLY.

Kempe's Engineers' Yearbook, 1961. Published by Morgan Brothers (Publishers), Limited, 28, Essex Street, Strand, London, W.C.2; price for the two volumes in a stout container, 90s. post free.

The great value of this two-volume engineering encyclopædia is realized when an executive has to tackle some job that has not previously come within his purview. Changing a fuel, the repainting of shops, patenting of an invention, or preparing foundations for a new machine may not be routine matters, but when such projects do arise an engineer can turn with confidence to the appropriate chapter of Kempe's for reliable basic information. Every year there are changes in the contents of this work of reference, but—*plus ça change, plus ça reste la même chose*—it remains one of the best sources of information on mechanical engineering developments. The information on foundry practice is both reliable and up-to-date.

Basic Electronics: Technical Press, Limited, 112, Westbourne Grove, London, W.2, announce that a new and revised edition of "Basic Electronics" (six parts), one of the titles comprising their illustrated course of elementary technician training, was published on March 16.

DISMISSAL OF 980 EMPLOYEES from their plants in Melbourne, Geelong, Brisbane and Adelaide is announced by the Australian Ford Motor Company, Limited. The dismissals are due to the present restricted economic conditions in Australia.

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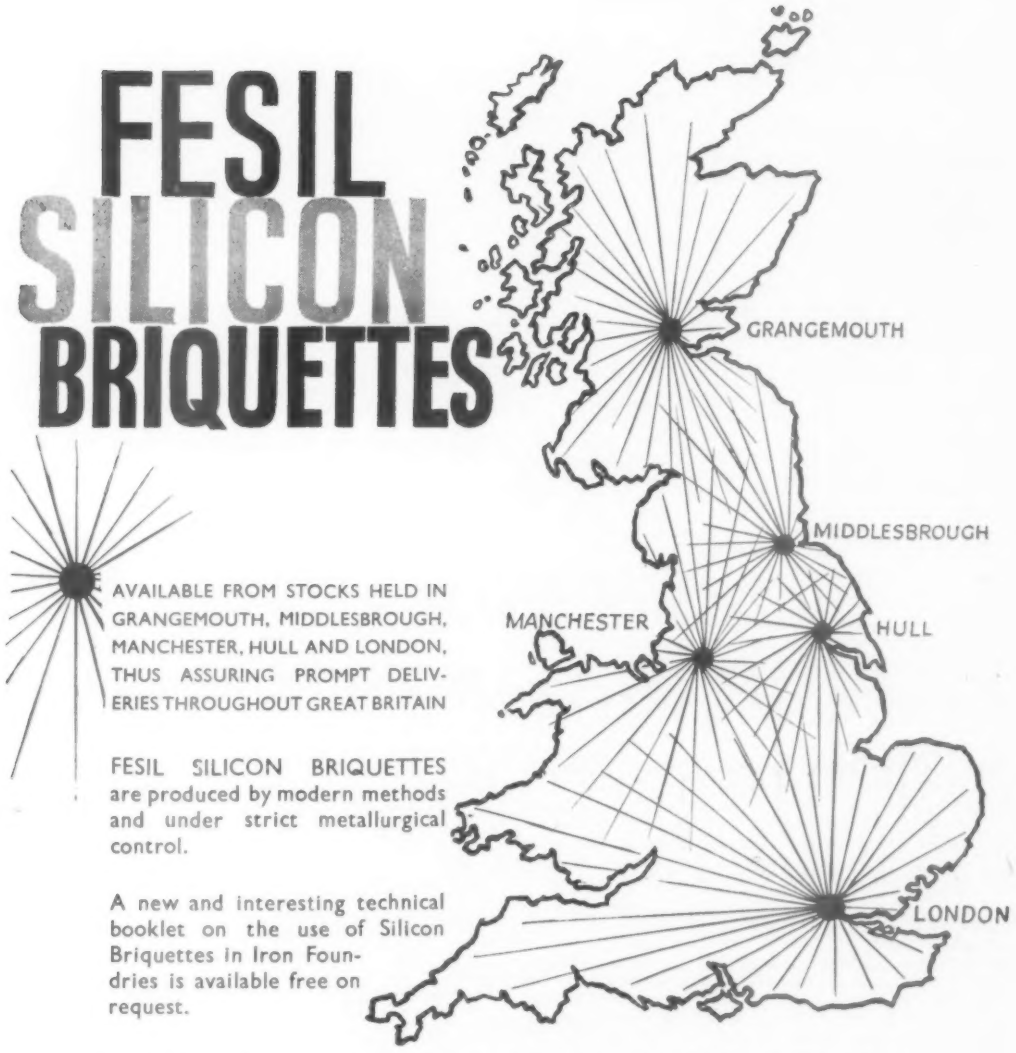

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Publications Received

Notes for Authors. Published by the Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1. (Available to JOURNAL readers free of charge on application to Mr. H. Cleere, assistant secretary of the Institute).

Unquestionably, this 8 by 5-in. 16-page publication is the best ever to reach the reviewer on the subject of preparation of technical papers. By meticulously following the precepts indicated, an author will not only do justice to himself and his employers, but will further the best interests of his professional institute. The average reader will probably get a shock when he learns all that is involved for the perfect reproduction in print of his work. The booklet in the first section takes him through all the various facets from typescript to proofs, graphs and tables to films and cross-references. Matter not included is that dealing with adoption of standard letter symbols, signs and abbreviations, but here it is stated that those set out in British Standard 1991, Part 1, 1954, are adopted, as this makes for uniformity among most of the British learned societies.

The second section of the publication deals with presentation of papers at meetings and here logical guidance is given, for instance, as to the need for giving only a short summary verbally when the material has been preprinted. Limitations are stated for what can properly be shown on lantern slides and this stricture alone proves the value of the booklet, as very many lecturers fall into grave error in that respect.

Whilst the booklet deals specifically with the requirements of the Iron and Steel Institute, the underlying principles apply to the preparation of any technical communications. (Readers taking advantage of the generous offer of copies should at least have the courtesy to send a pre-stamped envelope.)

Report of the Third European Foundry Apprentice Competition. Published by Sub-committee No. 1 (Training), of the Comité Europeén des Associations de Fonderies. (A limited number of copies are available from the Training Section of the Council of Ironfoundry Associations, 14, Pall Mall, London, S.W.1.)

The practical side of the third European Foundry Apprentice Competition was held last May in the training foundry of F. H. Lloyd & Company, Limited, Wednesbury, Staffs, and the written part at the National Foundry College, Wolverhampton, and the Report follows the same pattern as the earlier ones. It includes both questions and answers set in the written papers and describes the nature of the practical test set. An appendix issued as a separate booklet carries illustrations covering many aspects of the event.

Engineers Buyers Guide, 1961 Edition. Published by *The Engineer*, 28, Essex Street, Strand, London, W.C.2; price 12s, post free.

This directory, although confined to firms advertising in *The Engineer*, is surprisingly comprehensive, and the lists provided (covering 1,860 firms) will provide answers to most engineering "where-to-buy" queries. The reviewer suggests that to the list of associations, institutes, and societies, the names of the following could be usefully added:—the Foundry Trades' Equipment and Supplies Association and the National Society of Master Patternmakers. The Guide is a very useful work of reference for any purchasing officer.

Plating Zinc-alloy Die-castings—An Atlas of Process Defects. Issued as Development Report, No. 64, by the British Non-Ferrous Metal Research Association, Euston Street, London, N.W.1; price 15s, post free.

Diecasters throughout the world will welcome this publication—unlike other atlases of defects, all the illustrations are at a magnification of eight times the original which aligns them with what is seen when using a pocket lens. It appears from the report that the majority of defects are not inherent in the actual casting, but are due to faulty subsequent processing. In every case dealt with, the cause is indicated and a remedy suggested. Nothing but praise can be accorded to this 16-page, excellently-produced publication.

Lloyd's Register of Shipping. Annual report for the Year 1960. Published from 71, Fenchurch Street, London, E.C.3.

Anybody interested in ships, either as laymen or suppliers of marine engineering plant and machinery, will find this report more than satisfying. The illustrations and sketches by David Knight are excellent and come from every quarter of the earth. The work of Lloyd's is well covered in the 100 pages of the report.

House Organs

Malleable Iron Facts, No. 65. Published by the Malleable Founders Society, Union Commerce Building, Cleveland 14, Ohio, USA.

This issue tells how the manufacture of the small, compact American cars has given increased work to the country's malleable ironfounders. Also included is an article on vice production, stressing the important part played by malleable castings in a "success story" about an American factory.

Durez Shell Moulding News, No. 30. Published by the Durez Plastics Division of the Hooker Chemical Corporation, North Tonawanda, New York, USA.

This issue carries an illustrated account of the shell-moulding department of the Hallstead Foundry, Hallstead, Pennsylvania, USA. How very candid are some of the American publications—in the account there is mention of a spate of waster castings which resulted from faulty roofs and the subsequent use of wet sand!

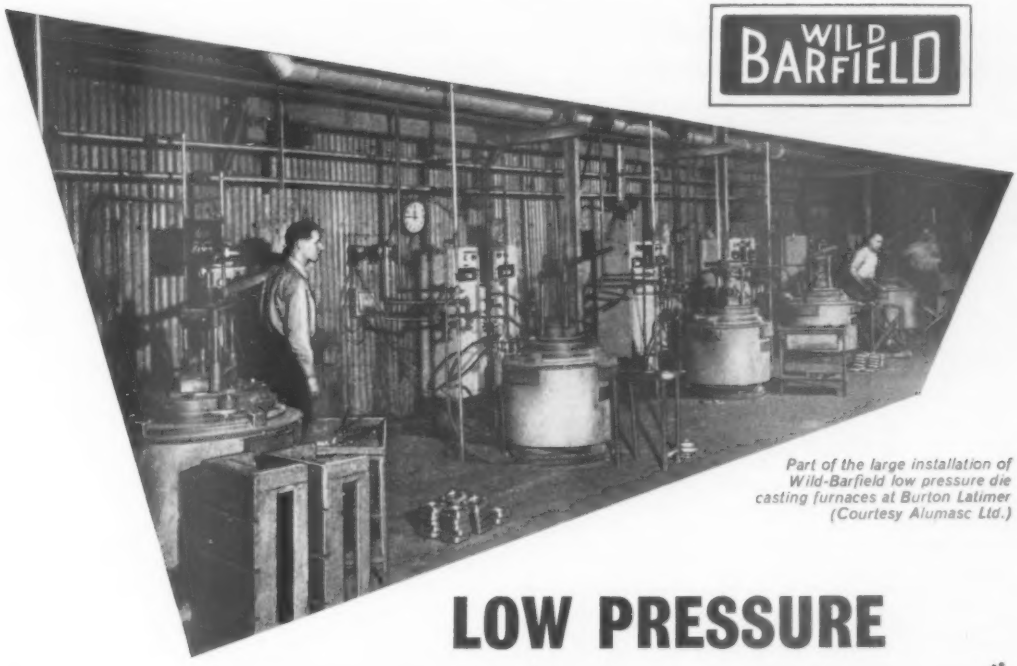
This is United Steel—a General Review of the United Steel Companies, Limited, published from The Mount, Sheffield 10.

This publication, running to over 50 pages and bound in a stiff blue cover, is exceptionally well illustrated in colour. It relates briefly the history and structure of the company, its output, activities, and finances. As a well-balanced account of all the major activities of an industrial concern, it could hardly be improved.

Nickel Bulletin, Vol. 33, No. 12. Issued by the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

In this issue items pertaining to electrodeposition are followed by sections on non-ferrous alloys, properties and applications of nickel/iron magnetic alloys; cast-iron (economic advantages offered by Ni-hard grinding balls) and on nickel-containing high-strength steels.

WILD BARFIELD



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Company News

Issue by John Lysaght's Overseas Subsidiary

The Australian subsidiary of John Lysaght, Limited, a member of the Guest Keen & Nettlefolds, Limited, group, is to be converted into a public company. An issue of 3,000,000 £A1 ordinary shares in John Lysaght (Australia) Pty., Limited, which makes galvanized iron and steel sheets, is to be made at 40s. a share. All the present issued capital is held by the UK company, whose holding will be 80.7 per cent. after the new issue.

The issue—one of the largest made in Australia for many years—will raise the paid-up capital from £A12,500,000 to £A15,500,000. The board expects to pay dividends of not less than 10 per cent. Earnings for 1960 exceeded 23 per cent. on the capital after the new issue indicating an annual profit of almost £A3,500,000.

OPPERMAN GEARS (HOLDINGS), LIMITED—All the issued share capital of a newly-formed subsidiary, L.S.A. (Exports), Limited, has been acquired.

FEDERATED FOUNDRIES, LIMITED—Dividend for 1960 is raised to 20 (17½) per cent. and group net profit was £220,033 (£187,059), after tax of £234,940 (£154,014).

TONKS (BIRMINGHAM), LIMITED, brassfounders, etc., of Birmingham—Final dividend is increased by 10 per cent. to 17½ per cent., making 22½ per cent. for 1960, compared with 12½ per cent. Net profit expanded from £44,172 to £68,898, after tax of £59,532 (£38,747).

NEWTON, CHAMBERS & COMPANY, LIMITED—Group trading profits increased from £1,404,711 to £1,626,003 in 1960, and the dividend is raised 2½ per cent. to 20 per cent. with a 12 per cent. final on a capital increased by a one-for-eight rights issue. The net profit is £618,001 (£558,097) after tax of £528,047 (£509,500).

POLLARD BALL & ROLLER BEARING COMPANY, LIMITED —Final payment of 15 per cent. for 1960 raises the effective total ordinary dividend to 18½ per cent. from the equivalent of 13½ per cent. for 1959 on capital increased by one-for-two scrip and three-for-20 rights issues. Group profits increased to £625,128 (£514,950), after tax of £291,248 (£235,120).

ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED—Orders received during 1960 totalled £223,000,000, compared with £182,000,000, and orders in hand at the end of the year amounted to £181,000,000 (£173,000,000). Group net trading profit was £4,722,439 (£4,746,987), after tax of £3,769,414 (£4,608,073). The dividend is maintained at 3s. per £1 unit with a final of 2s.

LAPORTE INDUSTRIES, LIMITED—Offer for the issued share capital of Howards & Son, Limited, has been accepted in respect of more than 90 per cent. of both the ordinary and preference shares of Howards, making the offer unconditional, subject to Stock Exchange quotation for the Laporte shares to be issued, and approval by shareholders of the increase of Laporte authorized share capital.

WHARTON CRANE & HOIST COMPANY, LIMITED—Dividend for 1960 is cut from the equivalent of 14⅔ per cent. to 10 per cent. with a final of 5 per cent. Net profit, after tax, was £533 (£37,219). The poorer 1960 results are attributed to the effects of the 1959 recession, keener prices, and the necessity to maintain overhead expenses at a high level to meet the rising volume of orders. The board states that the current order-book is "well filled."

Increases in Capital

PADLEY & VENABLES, LIMITED, Sheffield, increased by £150,000 in 1s. ordinary shares, beyond the registered capital of £200,000.

LEYLAND METAL COMPANY, LIMITED, Preston (Lancs), increased by £1,000 in £1 ordinary shares, beyond the registered capital of £500.

AIRSCREW COMPANY & JICWOOD, LIMITED, increased by £850,000 in 2s. ordinary shares, beyond the registered capital of £750,000.

COVENTRY APEX ENGINEERING COMPANY, LIMITED, increased by £3,000 in £1 ordinary shares, beyond the registered capital of £2,000.

BRISTOL TOOL & GAUGE COMPANY, LIMITED, increased by £50,000 in £1 ordinary shares, beyond the registered capital of £5,000.

PORTSMOUTH STEEL COMPANY, LIMITED, London, E.C.2, increased by £75,000 in £1 ordinary shares, beyond the registered capital of £25,000.

RICHARDSON ENGINEERING (BIRMINGHAM), LIMITED, increased by £10,000 in £1 ordinary shares, beyond the registered capital of £10,000.

ROTHER IRONWORKS, LIMITED, Rye (Sussex), increased by £5,000 in £1 ordinary shares, beyond the registered capital of £15,000.

A.B. METAL PRODUCTS, LIMITED, London, N.W.1, increased by £100,000 in £1 ordinary shares, beyond the registered capital of £150,000.

CADMIA ENGINEERING, LIMITED, Brightlingsea (Essex), increased by £4,900 in £1 ordinary shares, beyond the registered capital of £100.

UNIVERSAL ENGINEERING COMPANY (WILLENHALL), LIMITED, increased by £8,000 in £1 ordinary shares, beyond the registered capital of £12,000.

RENAULT MACHINE TOOLS (U.K.), LIMITED, Shrewsbury, increased by £80,000 in £1 ordinary shares, beyond the registered capital of £20,000.

CAM GEARS, LIMITED, engineers, etc., of Luton (Beds), increased by £925,000 in £1 ordinary shares, beyond the registered capital of £200,000.

VILLIERS ENGINEERING COMPANY, LIMITED, Wolverhampton, increased by £500,000 in 5s. ordinary shares beyond the registered capital of £1,750,000.

FORDHAM PRESSINGS, LIMITED (formerly Fordham (Holdings), Limited), sanitary engineers, etc., of Wolverhampton, increased by £99,900 in £1 ordinary shares, beyond the registered capital of £100.

ELAND ENGINEERING COMPANY, LIMITED, Kingston-on-Thames, increased by £8,000 in 150 ordinary and 7,850 6 per cent. non-voting preference shares of £1 each, beyond the registered capital of £2,000.

L. STERNE & COMPANY, LIMITED, manufacturers of gas engines, refrigerators, machinery, etc., of London, S.E.5, increased by £460,000 in 5s. ordinary shares, beyond the registered capital of £840,000.

K.G. (HOLDINGS), LIMITED, London, W.1, increased by £500,000 in 100,000 7½ per cent. cumulative preference shares of £1 and 8,000,000 ordinary shares of 1s. each, beyond the registered capital of £500,000.

MIDLAND EXPANDED METAL COMPANY, LIMITED, Wakefield, increased by £1,500 in 1,000 cumulative redeemable participating preference and 500 ordinary shares of £1 each, beyond the registered capital of £2,000.

HECLA MANUFACTURING COMPANY, LIMITED (formerly Municipal Appliances Company, Limited), manufacturers of engines, boilers, etc., of Preston (Lancs), increased by £10,200, in £1 ordinary shares, beyond the registered capital of £50,000.

Executive Changes in Asquith Group

Among the several executive changes announced by the Asquith Machine Tool Corporation, Limited, group, is the resignation of Mr. G. W. Nicholls from the board of William Asquith, Limited, in order that he can devote more time to its associated company, Modern Foundries, Limited, of which he is managing director. Ormerod Shapers, Limited, and Kitchen & Wade, Limited, other members of the Asquith group, also announce changes.

Mr. E. Stott has resigned as managing director and from the board of Ormerod Shapers. He is suceeded by Mr. W. A. Hannaby who is to combine the office of managing director of that company with Kitchen & Wade. Mr. D. A. Farrar, assistant managing director of Ormerod Shapers, has been appointed a director of Kitchen & Wade.

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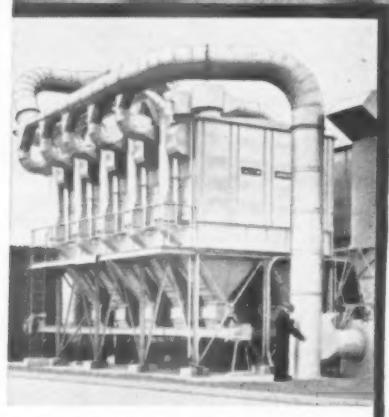

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CRC 98

Raw Material Markets

Iron and Steel

Substantial outputs of castings are forthcoming from the ironfoundries and those producing high quality castings are in the most favourable position. Recently, production of these castings has been increased to meet the demand from the car industry, whose intake of castings, although well below that of the boom period, has enabled most of the engineering foundries catering for it to revert to a full working week. Appreciable quantities of high duty castings also continue to be specified freely by machine-tool makers, power and electrical plant manufacturers, the heavy engineering trade, and agricultural implement makers. These requirements are enabling the engineering and speciality foundries to produce substantial outputs. Their pig-iron requirements are consequently high, particularly for the low phosphorus grade which is available in adequate supply from the several furnaces now providing this iron. Large tonnages of hematite are also being taken up by the engineering and speciality foundries and where required refined pig-iron can be obtained to requirements.

More work is needed, particularly from the domestic utensil trade, by the light foundries if they are to improve outputs. Although steady demands for castings are being made, the amount of work on hand is well below that required to keep all mechanized plants in full production. There is a fairly good demand for builders' castings. The jobbing foundries are fairly well employed, but as with the textile foundries, they are able to undertake a much larger volume of orders. The high phosphorus irons used by these foundries are readily obtainable and producing furnaces have tonnage to spare. With stocks on hand at the furnaces and current production in excess of home demands, consignments continue to be shipped abroad against strong foreign competition. Generally the foundries are able to cover their scrap requirements in both cast iron and steel, but the arisings of the better and heavy grades of cast-iron machinery scrap are scarce. Foundry coke is being supplied satisfactorily and ganister, limestone, and firebricks can be obtained on demand.

Most of the re-rollers continue to produce good outputs of small bars and light sections, whilst the heavy call for reinforcing rods and bars is sustained. The improved trading position in the motor car industry is expected to increase demand for strip and bright drawn bars. Present demands for small bars and light sections are still below previous levels, and will need to show an improvement if the re-rollers are to maintain full production.

Mild steel semis are plentiful from home steelworks which have tonnages to spare, although for carbons and alloy steel billets the supply position is not so favourable. Many of the re-rollers have good stocks of mild steel billets, blooms, and slabs and are only indenting for fresh supplies as these stocks are reduced. The re-rollers are readily taking up all arisings at the steelworks of suitable re-rolling defectives and crops.

Non-ferrous Metals

Once again tin is the centre of attraction of the non-ferrous metals market and the price has gone ahead sharply in London, in Singapore, and in New York. The underlying strength of the market arises from the metal's sound statistical position which has been underlined recently by the knowledge that production in the Congo is virtually at a standstill. The market has been further strengthened by the forecast of a shortfall of 10,000 tons of metal this year.

In these circumstances demand has been good from all sources and the price is going towards £830 a ton, the minimum price level at which the buffer stock manager can take steps to relieve any shortages which may develop. In the US the price is around $1.04 a pound.

Copper in London is a hesitant, drifting market. However, bear covering prompted by the withdrawal of South Africa from the Commonwealth has helped to sustain prices, but with stocks still rising and no significant change in demand the outlook must still be towards a continuance of the present indecisive price trend. In the US the market is showing a slight improvement and the price is unchanged at 29 cents a pound.

Lead is a good market in London under the influence of the Lead, Zinc Study Group meeting in Mexico City which started at the beginning of this week. It is generally believed that the group will recommend general production cut-backs and this should help the market which is fluctuating narrowly around £68 a ton. In the US the market is showing improvement and the price is holding at 11 cents a pound.

Zinc is reasonably steady on both sides of the Atlantic. In London the feature of the market is the demand for nearby supplies and the price is fairly steady around £85 a ton. In the US the quotation is unchanged at 11½ cents a pound for East St. Louis spot metal.

Recent Wills

THOMAS, PROF. W. N., Emeritus Professor of Engineering, University College, Cardiff £27,290

PARK, W. H., former director of Harland & Wolff, Limited, shipbuilders etc., of Belfast £25,580

PEIRSON, G. F., former commercial manager of the United Coke & Chemical Company, Limited ... £8,697

GARDNER, ALBERT, a director and commercial manager of Cammell Laird & Company (Shipbuilders & Engineers), Limited, Birkenhead £19,656

PLOWRIGHT, ROBERT, deputy chairman of Plowright Bros., Limited, mining and mechanical equipment manufacturers, of Chesterfield, and a grandson of the founder of the firm £42,198

PHILLIPS, DAVID LUTHER, head of the Sketty Hall laboratories of the British Iron and Steel Research Association for eight years until he retired in 1954 ... ... £3,617

SMITH, F. W., chief engineer for 21 years of the Sheepbridge Company, Limited, iron and steel makers, of Chesterfield, and formerly chief engineer at a number of collieries £30,862

BRUCE, DAVID, managing director of British Polar Engines, Limited, Glasgow, until 1959, when he became deputy chairman of Associated British Engineering, Limited, the parent company ... £17,604

SIMON OF WYTHENSHAWE, LORD, president (and former governing director) of Simon-Carves, Limited, and president (and former chairman) of Henry Simon (Holdings), Limited, well-known industrialist and worker for social welfare £397,564

COWAN-DOUGLAS, HUGH, chairman of Glenfield & Kennedy, Limited, Harland Engineering Company, Limited, and Blackett, Hutton & Company, Limited, and a director of Carntyne Steel Castings, Limited, and other companies £68,998

CRAWFORD, JOHN, for many years associated with Stewarts and Lloyds, Limited, general manager of the Islip furnaces and chief fuel buyer for the Corby works until his retirement 14 years ago, chairman of Hydroprest Concrete, Limited, Scunthorpe £135,328

BAUGH, FREDERICK, founder and managing director of Alexander Metal Company, Limited, metal manufacturers, of Bilston (Staffs), director of William Downde, Limited, iron and steel stockholders, of Bilston, and past president of the British Bronze and Brass Ingot Manufacturers' Association £133,415

Baker Perkins Foundry Machinery at work in Wilmer Lea Foundries Limited

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B.P.110

Current Prices of Iron, Steel, and Non-ferrous Metals

(Basis prices, delivered unless otherwise stated)

March 22, 1961

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P 10-ton lots or over, £23 5s. 0d., delivered Birmingham £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over; N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £45 0s. 0d. to £48 0s. 0d., scale 15s. 0d. per unit, lumpy, 75 per cent. Si, £62 0s. 0d. to £66 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s.10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 9s. 11d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 12s. 11d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £81 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free £275 0s. 0d.; 96/98 per cent., £285 0s.0d.

Ferro-columbium.—65/67 per cent. Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £58 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t.s. 100 tons and over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons and over, £32 5s. 6d.; hard (0.41 to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up to 0.25 per cent. C, £40 11s. 0d.; silico-manganese, £43 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

* Average 68-70 per cent.

FINISHED STEEL

Heavy Plates and Sections (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 0d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 11s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £66 7s. 0d.; nickel-chrome, £97 1s. 0d.; nickel-chrome-molybdenum, £109 14s. 0d., in lots of 25 tons and over.

NON-FERROUS METALS

Copper.—Cash, £224 15s. 0d. to £225 0s. 0d.; three months, £226 5s. 0d. to £226 10s. 0d.; settlement, £225 0s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 1¾d. per lb.; rods, 240s. 6d. per cwt. basis; 20 s.w.g., 275s. 6d. per cwt.

Tin.—Cash, £819 10s. 0d. to £820 0s. 0d.; three months, £821 10s. 0d. to £822 0s. 0d.; settlement, £820 0s. 0d.

Lead (Refined Pig).—Second half March, £66 10s. 0d. to £66 15s. 0d.; second half June, £67 17s. 6d. to £68 0s. 0d.; settlement, £66 15s. 0d.

Zinc.—Second half March, £83 17s. 6d. to £83 10s. 0d.; second half June, £83 2s. 6d. to £83 5s. 0d.; settlement, £83 10s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £122 15s. 0d.; rolled zinc (boiler plates), all English destinations, £121 0s. 0d.; zinc oxide (Red Seal) d/d buyers' premises, £97 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 9¾d. per lb.; sheets to 10 w.g., 200s. 3d. per cwt.; wire, 2s. 8½d.; rolled metal, 200s. 3d. per cwt.

Brass (Brazing).—BS1400, B3, £177; B6, £224.

Brass (High Tensile).—BS1400, HTB1, £196; HTB2, £213; HTB3, £232.

Gunmetal.—BS1400, LG2, £221; LG3, £231; G1, ½%, £294; G1, 1%, £284.

Phosphor Bronze.—BS1400, PB1 (AID released), £311; BS1400, 90/10/1, £299.

Leaded Phosphor Bronze.—BS1400, LPB1, £242.

Phosphor Bronze Strip, etc.—Strip, 287s. 3d. per cwt.; wire, 4s. 1d. per lb.; rods, 3s. 3¼d.; tubes, 3s. 3¼d.; chill cast bars, solids 3s. 3¼d.; cored 3s. 4¼d. (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3½d.; special quality turning rod, 10 per cent., ⅛ in. dia., in straight lengths, 4s. 2½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £69 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £245; AB2, £253.

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In the world of non-ferrous metals Platt's bring an inherent flair to the manufacture of
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CLASSIFIED ADVERTISEMENTS

PREPAID RATES: **Twenty words for 10/- (minimum charge) and 4d. per word thereafter. Box numbers 2/6 extra per insertion (including postage of replies). Situations wanted 2d. per word throughout.**

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House, 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

YOUNG FOUNDRY TECHNICIAN, City and Guilds Foundry and Patternmaking Certificates. Served metallurgical apprenticeship with Ferrous and Non-ferrous Foundries. Seeks interesting position with prospects. Box YF674, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE with extensive connection in London and Home Counties with large industrial groups wishes to represent a foundry for cast iron non-ferrous die castings, etc. Good personal connection, commission and part expenses. Box TR677, FOUNDRY TRADE JOURNAL.

GENERAL MANAGER seeks position. Twenty-four years senior position. Administration covers: customer contact, sales, estimating, quoting. Sound knowledge production control, bonus system, large and small castings. Sound metallurgical control, blackheart, whiteheart, grey iron steels and non-ferrous. Sand and gravity die casting. Used to large and small companies. Present salary £2,000. Car. Box GM676, FOUNDRY TRADE JOURNAL.

LANCASHIRE and CHESHIRE AGENT, many years' experience with general sales, own saloon car, will be pleased to hear from a manufacturer wishing to be represented on this area. Box LA663, FOUNDRY TRADE JOURNAL.

FOUNDRY MAN, aged 50, A.M.I.B.F., light castings, light jobbing floor, mechanisation in all phases, shell moulding, grey and high duty irons, seeks a change. Box FM666, FOUNDRY TRADE JOURNAL.

MANUFACTURER'S AGENT operating in Birmingham and the Midland Counties having well established connections amongst all classes of manufacturers would like to contact a foundry who may be requiring representation on an agency basis in this area. Box MA656, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

FOREMAN required for modern Iron and Steel Foundry in Midlands area. Good knowledge of mechanised production most essential. Reply stating age, previous experience and salary required. Box FR637, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required for iron and non-ferrous foundry in Hertfordshire. Must be active man, fully experienced in the production of castings in high grade metals by machine, plate and loose-pattern methods. Core blowing experience also desirable. Applicants must state age, experience, marital status and give indication of salary requirements. Box FM657, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

Advertisers whose announcements appear under a box number are urged to acknowledge, however briefly and informally, all replies received. This particularly applies to advertisements under "Situations Vacant"; serious inconvenience and, sometimes, real hardship can be caused to applicants who receive no indication even of the safe receipt of their communication. Failure to acknowledge replies can also reflect on the good faith of this journal, which is responsible for their onward transmission. If it is desired to maintain anonymity, an acknowledgement on plain paper, quoting the relevant box number, is all that is necessary.

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Required to take charge of a Semi-mechanised non-ferrous Foundry. Applicant must have practical and supervisory experience and be conversant with Core making, Blown and Shell cores, and sand blasting. This is a well paid staff appointment for the selected applicant.

Apply giving age, experience and salary to :—

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Foundry Trade Journal

H. J. Maybrey & Co., Ltd

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ALUMINIUM-ALLOY GRAVITY-DIE NIGHT FOREMAN

At least five years' experience in capacity of foreman, capable of working on own initiative, good administrator and disciplinarian. Five-night week, 7.30 p.m. to 6.30 a.m., weekly staff status. Salary £22.10s. per week inclusive of nightwork premium, plus production bonus. Contributory pension scheme after probationary period. Details of experience and position held to—

Mr. S. B. Dew, *general manager*,
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Lower Sydenham,
London, S.E.26.

SITUATIONS VACANT—*contd.*

FURNACEMAN wanted for South London Foundry. Must be fully experienced in melting all non-ferrous specifications to A.I.D. Conditions in Morgan and Sklenar Furnaces. State full details and wage required to Box FW652, FOUNDRY TRADE JOURNAL.

AN energetic CORESHOP FOREMAN is required in a South of England Iron Foundry. A good basic training in Coremaking is essential and there are good prospects for the right man. Apply Box AE648, FOUNDRY TRADE JOURNAL.

REPRESENTATIVES. Salary of £1,000, rising to about £2,000, with car and expenses provided. Applications are invited from those with ambition to join expanding Sales Organisation. Successful applicant will be required to operate from Leeds and will be responsible direct to principal. Must have sound engineering background. Degree preferred, and possess current clean driving licence. Sales experience not essential. Age 30-40. Write details to Box RS640, FOUNDRY TRADE JOURNAL.

EXPERIENCED WORKING CHARGE HAND also LOOSE PATTERN MOULDERS for rapidly expanding Non-Ferrous Foundry in S.E. London. Apply M.R.T. CASTINGS LTD., Peckham Hill Street, S.E.15. New X 0364.

FOUNDRY FOREMAN required for Iron Foundry 20 miles West of London. Excellent prospects for practical man with experience of high grade quality castings, produced by machines, plate and floor methods. Candidate must be capable of accepting responsibility and direction of labour. Write giving full details and salary required to Box FF672, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required. Capable of controlling a new mechanised plant now in course of erection. Able to take full responsibility for cupola control and Core Shop. Must have practical and technical experience. Permanent, pensionable position with good prospects. Apply, giving details of age, experience and salary required, to Box RC658, FOUNDRY TRADE JOURNAL.

ASSISTANT FOUNDRY MANAGER required by Ironfoundry in Midlands. Experience of machine moulding and non-ferrous casting an advantage. Full details including age and salary required to Box AF661, FOUNDRY TRADE JOURNAL.

SALES REPRESENTATIVE required for Non-ferrous Foundry, Home Counties. Fully capable to promote new business on commission basis if necessary. Very good prospects for energetic person, with established connection. Write in confidence giving full details of experience, age, and salary required, to Box SR667, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

FOUNDRY FOREMAN required to take charge of Ironfoundry in East Midlands, producing high grade grey iron castings in low and medium phos., up to 3 tons, for machine tools and high pressure applications. Experience in all aspects of Grey Iron practice essential, also drive, initiative and organising ability, together with ability to control labour. Box WF665, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE (Castings) required for London and Home Counties north of the Thames. Experience in similar capacity, or foundry/mechanical engineering background necessary. Write to J. D. S. TOWNSHEND & Co. LTD., Founders' Representatives, 12, South Drive, Banstead, Surrey.

FOUNDRY MANAGER required by old established non-ferrous foundry and engineering firm situated on North East Coast. Duties will comprise control, with responsibility to Works Manager, of floor and mechanised foundries. Applicants must have practical and technical experience of non-ferrous founding in standard alloys and in the use of modern techniques including core-blowing, CO_2 and shell moulding and of sand control. The successful applicant would be required to join contributory staff pension scheme with free life assurance. Assistance with housing is possible. Applicants should state age and give in chronological order full details of training, experience and positions held. Salary in range of £1,100 to £1,250 according to age and experience together with bonus. Box FM660, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

FOUNDRY MANAGER, for well-known Manufacturers of Domestic Boilers near Derby. Must have had considerable experience in Light Mechanised Foundry Practice, Cupola Control, etc. Good conditions of service. Commencing salary £1,450 per annum with increase and Service Agreement after probationary period. Profit sharing Bonus Scheme. Housing assistance will be considered. Contributory Pension and Life Assurance Scheme in operation. Application in writing to Box FM664, FOUNDRY TRADE JOURNAL.

METALLURGIST required for large Grey Iron Foundry in the Wolverhampton area, producing castings up to 20 tons in weight for the machine tool and diesel engine industries. The successful applicant will have full control of cupolas and will be responsible for producing Grey Iron to all specifications. Applications in confidence with details of age, training, experience and salary required to: THE SECRETARY, Box MR662, FOUNDRY TRADE JOURNAL.

METALLURGIST — ASSISTANT required by Company operating modern mechanised Foundries producing Grey, High Duty and Malleable iron castings. Experience in Cupola operation in one of these fields is desirable since successful applicant will be required to take control of a melting unit. Excellent opportunity for Metallurgist in the age range 23-30 to join expanding organisation. Modern housing accommodation can be arranged if required. Please apply, giving age, details of experience and salary required to PERSONNEL OFFICER, Guest, Keen & Nettlefolds (Cwmbran), Ltd., Clomendy Road, Cwmbran, Mon.

MACHINERY WANTED

WANTED. Shot Blasting Machine, table type, 90 in. Information required: make, age, condition and where machine can be seen working. Box SB633, FOUNDRY TRADE JOURNAL.

WANTED.—Pin type closing Machine for Shell Moulds. Reynolds or similar make. Sklenar furnace for GM., 200 lb. capacity minimum. Cutting off stone. Table type 12 in. or 14 in. wheel. Box WP675, FOUNDRY TRADE JOURNAL.

WANTED. Moulding Boxes—Steel—Second hand, 17 in. × 14 in. by 3 in. × 3 in. pin centres 20¼ in. Large quantities required in good condition. Box MB649, FOUNDRY TRADE JOURNAL.

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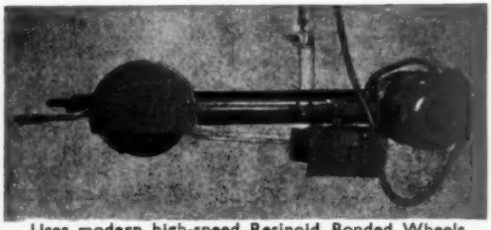

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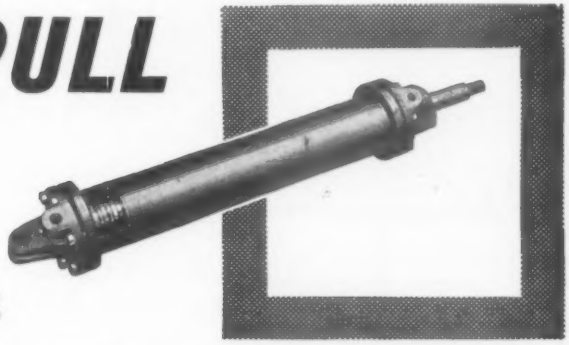

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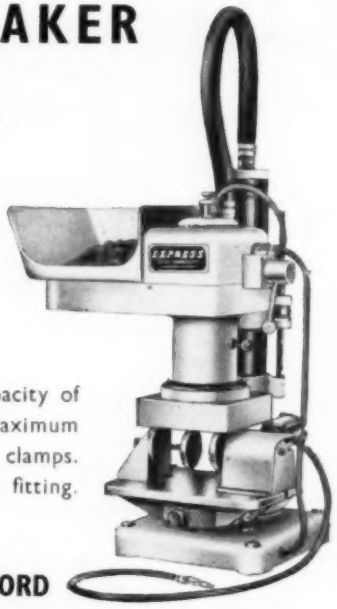

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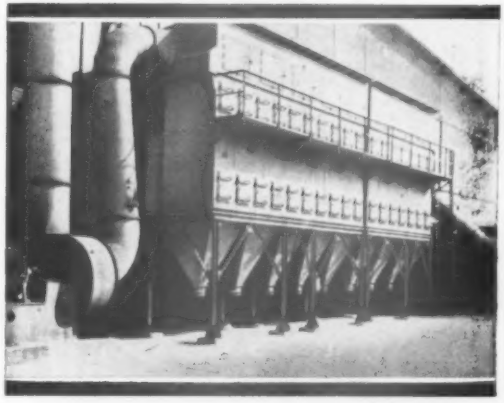

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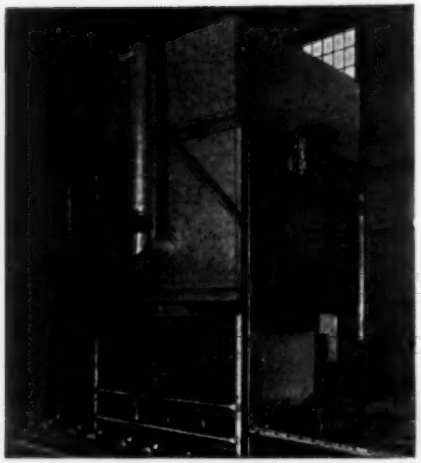

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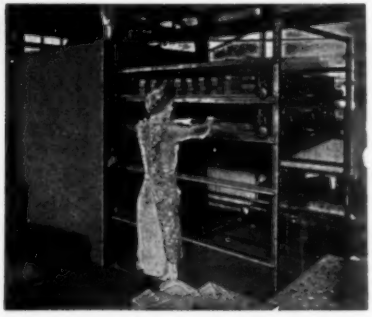

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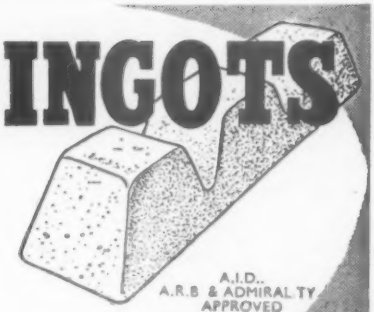

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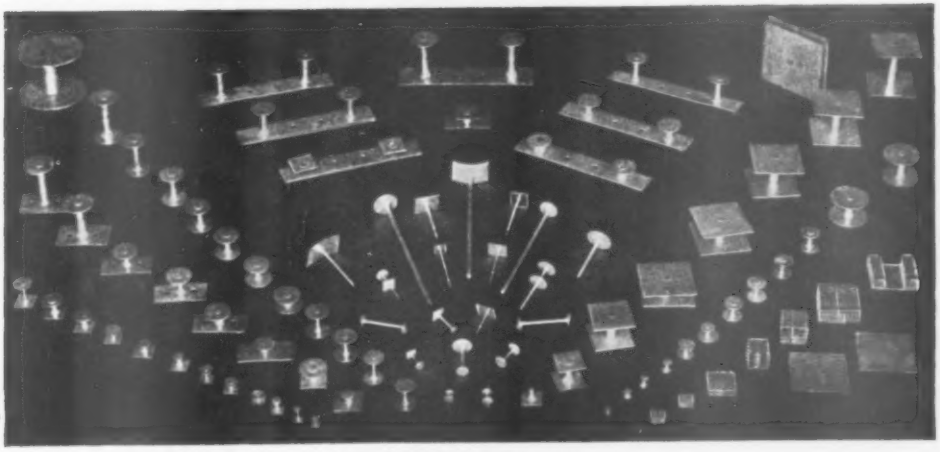

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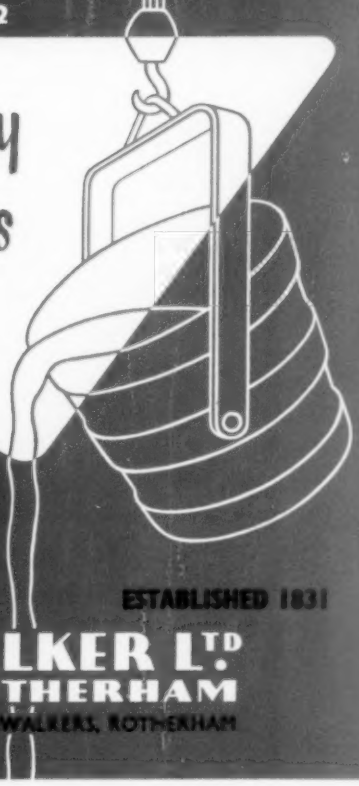

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